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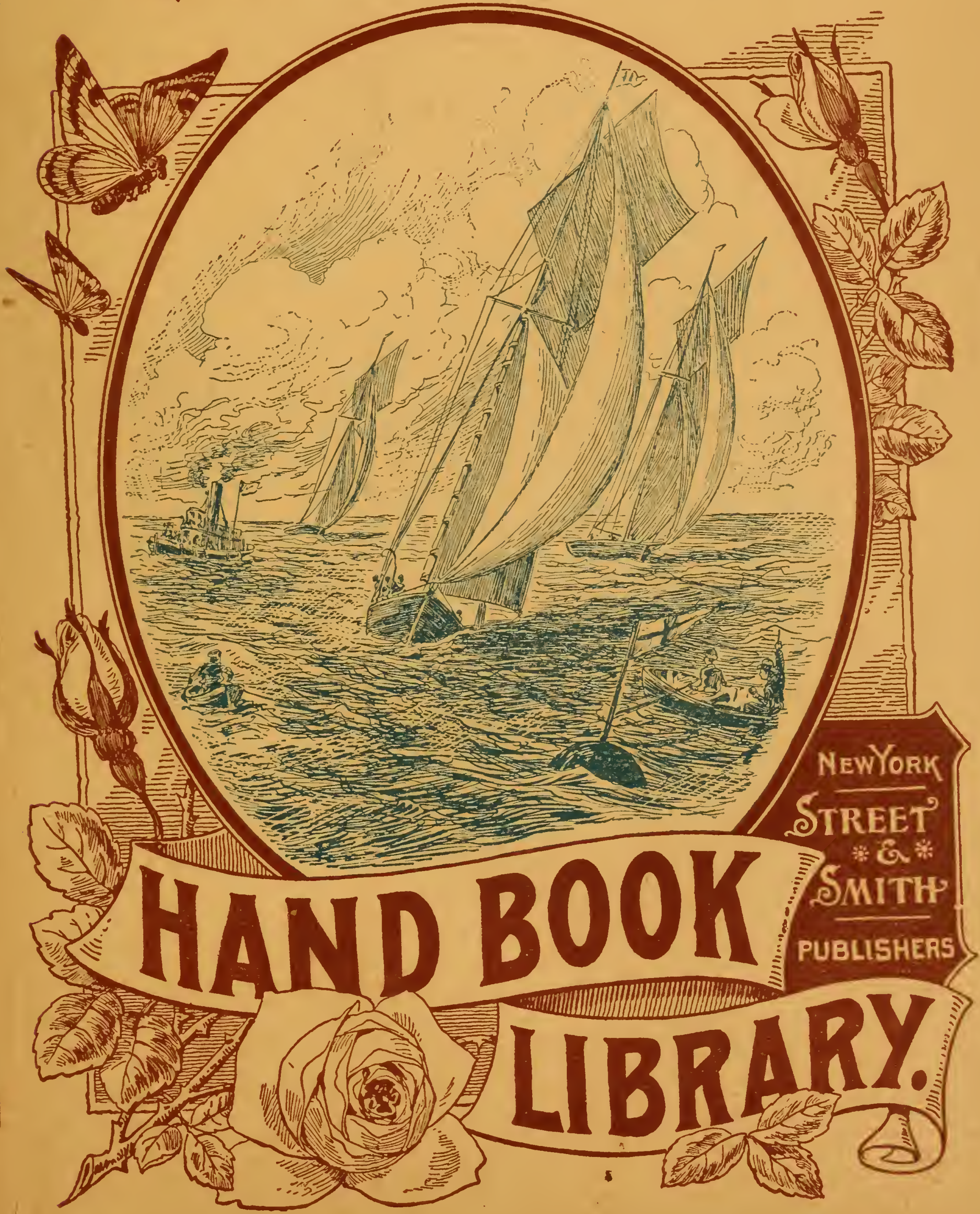

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AQUATIC GUIDE;

OR,

YACHTING AND SAILING.

A Complete Hand-Book of Useful Information
for All Lovers of this Delightful Sport,
Containing Full Instructions for
Handling and Sailing Boats.

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NEW YORK:
STREET & SMITH, Publishers,
31 Rose Street.

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AQUATIC GUIDE; or, YACHTING AND SAILING.

CHAPTER I.

INTRODUCTORY.

The choice of a boat.—Description of the various parts of a cutter.

More, probably, could be written on boat-sailing than on any other sport; for this pursuit owes much of its extraordinary fascination to the fact that its science is practically infinite; the most experienced sailor has always something new to learn, and is ever acquiring fresh wrinkles. Of all inanimate objects a boat is surely the most beloved of its owner; there is something almost human in its ways and vagaries; and whereas it is possible to conceive the attainment of perfection in the design of the instrument employed in any other sport, the complexity of the problem involved in producing the ablest craft renders improvement ever possible, and the sailing of a boat is not more fascinating than the designing of one.

It is easy to acquire the art of sailing a boat under favorable circumstances; but it is only after considerable experience that the sailor is able to do the right thing promptly in the various emergencies which he is sure to encounter. The tyro will soon discover that the more he knows, the more he has left to learn, and if once he commences to acquire this knowledge of seamanship, he will be thirsty for more, and he will never weary of his favorite sport all the days of his life.

This book is intended for the tyro, and in it, therefore, only the more neessary and elementary portions of nautical science will be treated of.

In the first place, he must have his boat, and to assist him in the selection of this is no easy task—so much depends on the idiosyncrasy of the tyro, the character of the waters he proposes to navigate, and other circumstances. It may be safely premised that he cannot possibly know what sort of boat will best satisfy his needs, and as his more experienced friends have each their separate views as to what he should procure in the way of a craft—their views of course depending not on his, but on their separate idiosyncrasies—it is many chances to one that, whether he follows the friend's advice or his own inexperienced inclination, he will not in the first instance obtain the boat he really requires. It is, indeed, as an old salt remarked, as impossible to choose for another man the boat that will suit him as to pick out a wife for him; and some men—good sailors, too—never succeed in mating themselves with the right craft, but are perpetually building or buying and selling again without ever satisfying themselves.

We, therefore, recommend the novice not to be over-ambitious at first. Let him content himself with a modest and inexpensive craft until he has acquired at least the rudiments of the art of sailing, and is better capable of deciding what he wants. Of course, if he has friends who own boats, on board which he can pass his apprenticeship, so much the better; but we have observed that as soon as a young fellow is bitten with a taste for sailing, he—small blame to him—insists on having a boat of his very own, and will take little pleasure in the boat of another.

In recommending the novice to content himself at first with a cheap boat, we of course do not mean a cheap bad boat, not one of those extraordinary bargains one comes across in the advertisement columns of the newspapers—a five-ton yacht, for instance, going for the ridiculous sum of twenty-five dollars, an ancient hull patched up with paint and putty, which will certainly cause much heartburning to the innocent novice who acquires possession of her, and will probably so disgust him that he will abandon yachting altogether. For first she requires a new mast, then she must have new sails, then it is found necessary to re-timber her, possibly re-deck her, and then, after twenty times the purchase-money has been spent upon her, it is discovered that the hull is so rotten that it were madness to put to sea in her at all; so all the expense has been for nothing, and the great bargain slowly falls to pieces, neglected, on a mud flat.

The following hints may prove of some service to a novice, who, despite what we have said, determines to commence his aquatic career by purchasing a second-hand yacht, without having a friend who can assist him in the examination of a vessel.

Though a craft will often be found to be as sound after thirty years or more as on the day she was launched, still if sappy wood was used in her construction, or if she has been neglected while lying up, she may become utterly worthless in less than ten years.

In surveying an old vessel, soft spots can be detected by thrusting a penknife into the wood.

Those streaks of her planking that are between wind and water, alternately dry and wet, will generally rot first.

The interior of the bottom should be carefully examined, in order to ascertain the soundness of the planking and timbers. Dry rot is likely to find its way into the inner sides of the stem and stern posts. If possible remove some of the saloon panels, for the space between a vessel's skins is a favorite nest for dry rot.

If a vessel is coppered and she is hauled up, the sheathing will be wrinkled in a horizontal direction if she has been in any way strained. These wrinkles beneath the channels show infallibly that her sides have been strained by the rigging. Vertical or irregular wrinkles on other portions of her copper may merely indicate that she has rubbed against some hard substance.

Look to the nails and bolts and see if they are corroded, or if copper nails have worked loose in consequence of the vessel's straining.

If spars are cracked in the direction of their length, this is of little consequence, unless the cracks are very deep. Such cracks should be stopped with putty when the wood is quite dry, so as to keep the wet out. When a spar is sprung the cracks will be transverse as well as lengthways.

A mast is liable to decay where it passes through the deck, also under the hounds.

Look with suspicion on a vessel that has cement in her bottom; for this prevents a proper examination of her interior. To fill up the spaces between the lower timbers with Portland cement is, as we shall show further on, an admirable plan; but it is often resorted to in order to conceal serious defects. The bottom of many an old craft is practically held together by cement.

Before describing the various forms of boats suitable for pleasure sailing, it will be well to give to the reader a general idea of the rigging and other parts of a small craft, so that certain terms which we shall have to use constantly may be understood by him.

Fig. 1 represents a small cutter rigged as simply as possible.

The spars are (1) the mast, which is what is known as a pole mast—that is, a mast complete in itself, having no topmast above it; (2) the bowsprit; (3) the boom; and (4) the gaff.

To support the mast and bowsprit, shrouds and stays are employed. The mainshrouds (5) and the forestay (6) are now generally of iron wire rope; the former rest on the projecting shoulders known as hounds (13), and are attached to the channels (14) on the side of the boat; 7 is the bobstay and 8 are the backstays or runners.

The sails are, A, the mainsail; B, the foresail; C, the jib. The mainsail is spread between the gaff and boom, being laced to the former. The foresail is hoisted up the forestay, to which it is attached by iron hoops. The upper edge of a sail is called the head; the lower edge is the foot; the fore edge is the luff, and the after edge is the leach. The upper fore corner is the throat of a sail; the upper after corner is the peak; the lower fore corner is the tack, and the lower after corner is the clew.

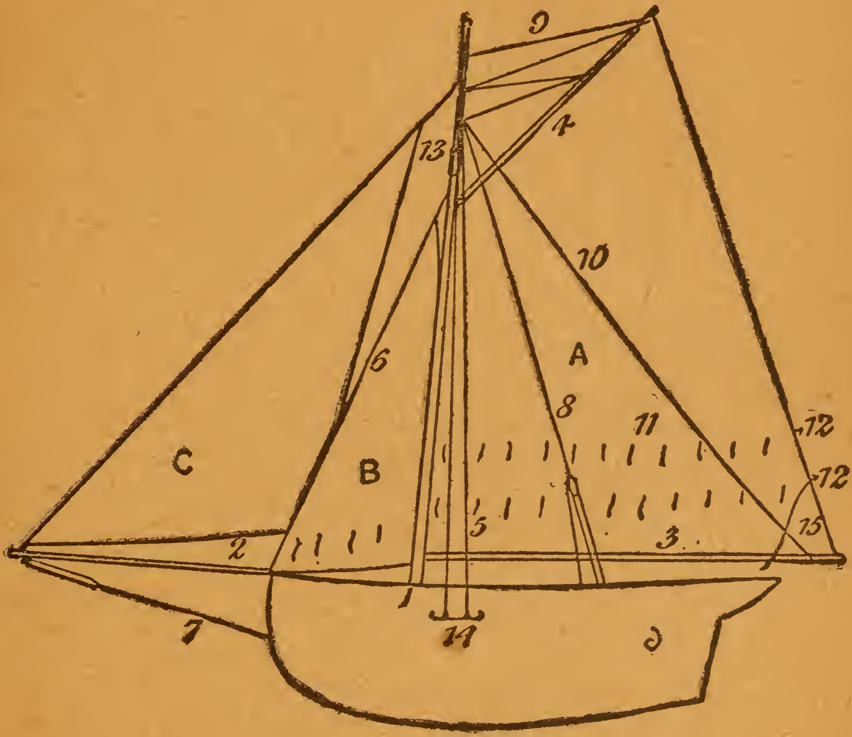

Fig. 1.

The ropes by which the sails are hoisted are called halyards. The mainsail has two halyards, the throat halyards which hoist the fore end of the gaff, and the peak halyards which raise its after end. The topping lift (10) tops up the boom and reelieves the sail of its weight.

The reef pennant (15), passing through an iron ring called the cringle (12) and the rows of reef points (11), serve to reef or shorten sail when necessary.

CHAPTER II.

THE ROPES.

Knots, Bends, and Hitches.

A man cannot be even an amateur sailor until he knows his ropes. A great number of knots, hitches, bends, etc., are employed by sailors; but the skipper of a small fore-and-after will find that the different manipulations of cordage which we will now describe will suffice his needs.

The ropes in ordinary use are what are known as hawser-laid ropes, and are thus put together. Several threads of hemp, called yarns, are twisted together to form a strand. Three strands twisted together from right to left form the hawser-laid or right-handed rope.

What is called a cable-laid rope contains nine strands, that is, three ordinary right-handed ropes twisted together from left to right into one large rope. Right-handed rope must be coiled "with the sun" from right to left. Cable-laid ropes must be coiled from left to right.

The ends of all ropes should be whipped to prevent the strands from unraveling. This is done with spun-yarn or tarred twine. The twine is wound round the rope in such a way that both ends of the twine are covered, and so secured by the laps, and no knot is necessary. It is very easy to whip a rope's end, but very difficult to describe the process in such a way as to make one's self intelligible to one who has never seen it.

Where a rope is liable to be chafed, as in the eyes of the rigging, it is wormed, parceled, and served. Fig. 2 will show how these operations are performed. Worming consists of laying spun-yarn between the strands, so as to fill up the spiral groove which every rope presents, and obtain a smooth surface. Parceling is wrapping narrow strips of tarred canvas over the worming; it is put on with the lay, that is, follows, the direction of the strands. Serving a rope is the laying on of spun-yarn or other small stuff over the parceling and worming. Service is put on against the lay of the rope. Before commencing to protect a rope in this way it should be stretched out as taut as possible with tackle, and the worming, parceling, and service should be laid on as tightly as possible. The service is hauled taut by a serving mallet. If the rope is a small one it may be served without worming, as the grooves between the strands are not deep enough to cause great unevenness of surface.

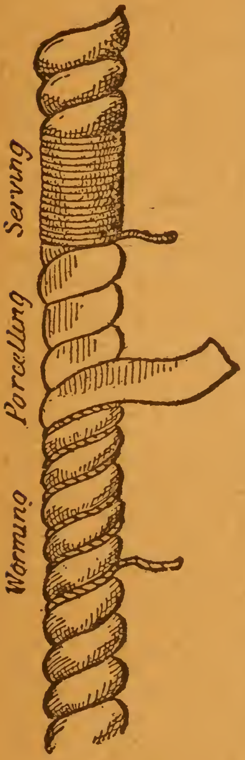

Fig. 2.

Splicing, by which the ends of ropes are neatly and permanently joined, is a necessary accomplishment of the yachtsman, and is easily acquired.

A Short Splice (Fig. 3).—Unlay the strands of both rope ends for a little way. Interlace the three loose strands of one rope with the three loose strands of the other, so that each strand of one rope is between two strands of the opposite rope. Then force each strand under the next strand but one opposite to it, and draw all tight. Repeat this operation with each strand, and the splice is made; but to finish it off neatly untwist each strand end, cut away half the yarns, and tuck in these reduced strands as before. A marline-spike or pricker is necessary to force open the strands under which the ends have to pass.

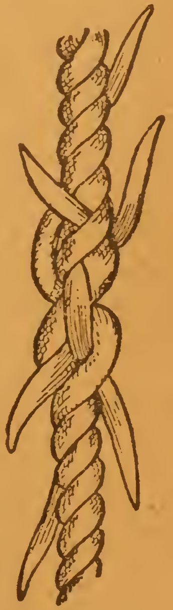

Fig. 3.

When two rope ends are joined by a Long Splice

(Fig. 4), the joined portion is no thicker than the rest of the rope, and will reeve through any block that will admit that rope; this splice is, therefore, very useful for repairing a halyard that has broken. Unlay the ends of the two ropes for a distance six times greater than for a short splice, and place the strands together as for a short splice. Unlay one strand of one rope for a considerable distance further, and fill up the interval thus left with the opposite strand from the other rope. Repeat this process with one strand of the other rope. Where the opposite strands meet, divide them, take an overhand knot in them, and tuck them in as in a short splice; but before cutting off the half strands the rope should be well stretched.

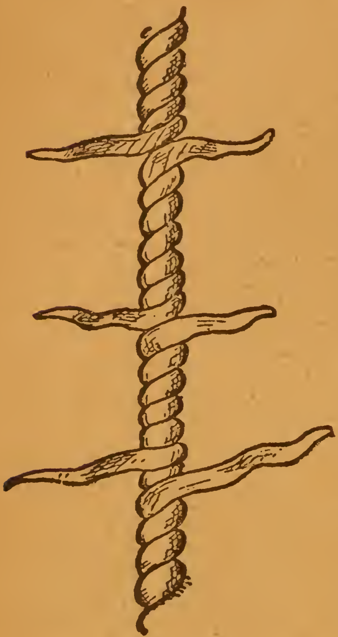

Fig. 4.

The yachtsman will use the Eye Splice (Fig. 5) more frequently than any other. The end of the rope is bent round so as to form a loop of the required size and the unlaid strands are tucked into the rope exactly as in the short splice.

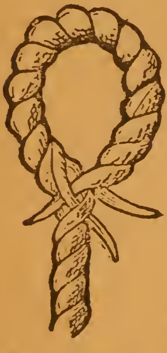

Fig. 5.

If one strand of an otherwise sound rope be cut through it can be replaced thus. Cut off about two feet of the injured strand. Take a somewhat greater length of a strand of the same size and lay it in the interval left by the removed portion of injured strand, then proceed to halve the strands, knot and tuck in as in a long splice.

A Grommet (Fig. 6) is a rope ring. Unlay a strand, without stretching it and so disturbing the turns in it. Form a ring of the required size by bending the end round on to the standing part. Then wind the strand twice round this ring, fitting it carefully into the crevices, so that the ring then presents exactly the appearance of the original rope from which the strand was taken. Where the ends meet take an overhand knot with them, halve the yarns, and tuck them in as in the long splice.

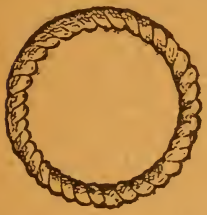

Fig. 6.

We now come to the various useful knots, bends, and hitches, all easy to acquire, but difficult to describe in words. However, if the reader will study the accompanying diagrams with a bit of rope in his hand he will soon discover for himself how these knots are formed. They all serve their purpose admirably—that is, they are quickly made, are secure, and cannot slip, and yet are readily undone again.

We must explain that the standing part of a rope is the portion held in the hand; the bight is the loop made in tying the knot; the end is that extremity of the rope on which the knot is to be made.

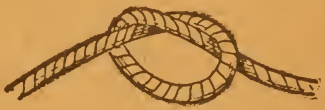

Fig. 7.

First we have the common Overhand Knot (Fig. 7), to which we have already alluded.

One overhand knot on the top of another will form a Reef Knot (Fig. 8), that is if the ends are crossed the right way; for otherwise it will be a Granny, (Fig. 9), the sailor's detestation. The novice on board a yacht is sure to be unmercifully chaffed should he have assisted at reefing the mainsail, and a granny be afterward discovered among the reef points. The figures will show that in the reef-knot both parts—the standing part and

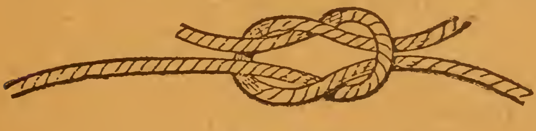

Fig. 8.

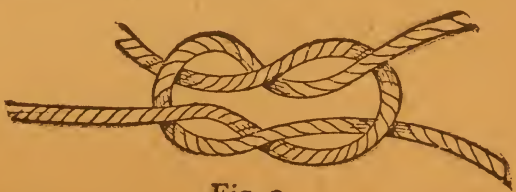

Fig. 9.

the end—pass through the bight the same way, not one under and one above as in the granny.

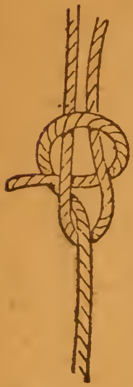

Fig. 10.

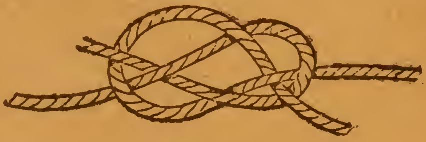

Fig. 11.

A Common Bend (Fig. 10) will bend two ropes together. Take up the end of one rope into a bight, and pass the end of the other rope through the bight round both parts and under its own standing part. A common bend also serves to bend a rope into an eye spliced into the end of another rope. The signal halyards are thus bent on to the burgee.

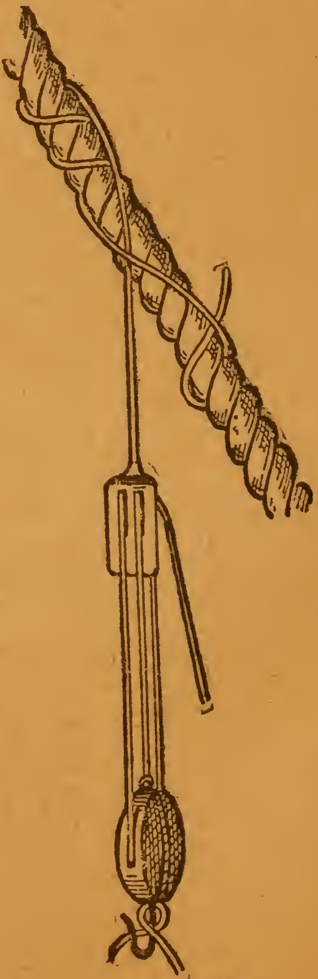

Fig 12.

A Carrick Bend (Fig. 11) will bend two ropes together more securely than the common bend.

When it is desired to fasten one rope on to the middle of another rope, so as to haul upon it, a Rolling Hitch must be used, as this, when jammed, cannot slip down the rope, and yet it is easily cast off again.

Fig. 12 represents a watch-tackle, with the tail of its upper block bent with a rolling hitch on to the rope it is intended to pull upon, while the hook on its lower block is made fast with a Blackwall hitch.

A watch-tackle is a very handy tackle on board ship, and is used for a variety of purposes.

A tail is strapped to the upper block and an iron hook to the lower block.

A very powerful purchase is obtained by using two watch-tackles in combination. This is done by making fast the tail of one watch-tackle to the hook on the lower block of the other tackle.

With a Blackwall Hitch a rope can be rapidly and securely fastened to a hook for a temporary purpose. The diagram will show how it is formed. The hitch is prevented from slipping by the jamming of the rope between its own standing part and the stem of the hook.

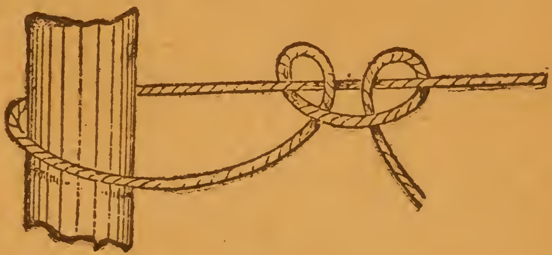

Fig. 13.

Two Half Hitches (Fig. 13) are very useful for bending a rope to a ring, a boat's painter to a post, and other purposes.

A Clove Hitch (Fig. 14) is employed to fasten a rope to a spar or to a stouter rope. In this way the ratlines are hitched to the shrouds, and a buoy-rope is fastened to an anchor.

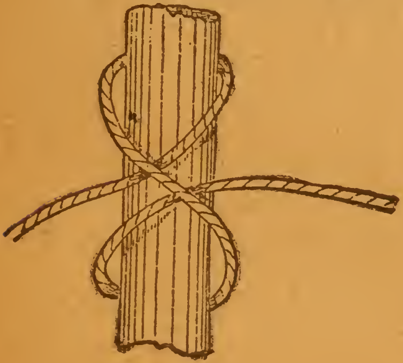

Fig. 14.

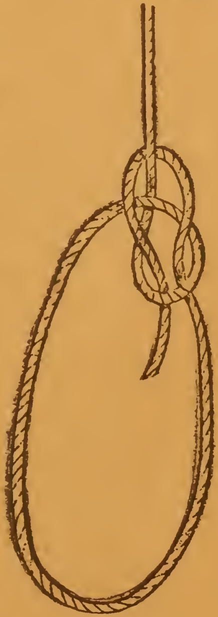

Fig. 15.

The Bowline Knot (Fig. 15) is somewhat more difficult to make than any of the preceding, but if the reader diligently imitates the form of the diagram with a piece of rope or string he will soon acquire the secret.

Where an easily running noose is required a Running Bowline (Fig. 16) is useful.

A rope can be quickly bent on to a spar by means of a Timber Hitch (Fig. 17), which does not readily slip.

A Topsail Halyard Bend (Fig. 18) is still less likely to slip. In this case a description may assist the diagram. Take three turns round the spar ; come back round the standing part; pass under all three turns, then over the last two turns and under the first turn.

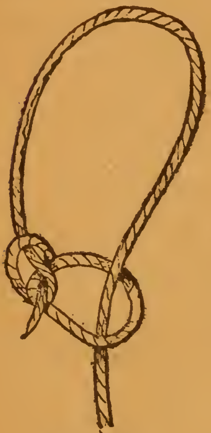
Fig. 16

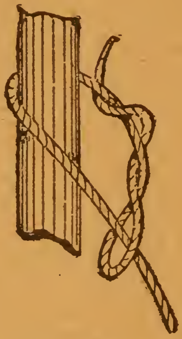
Fig. 17.

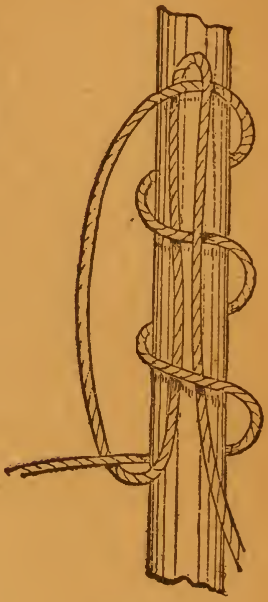
Fig. 18.

The most secure way of fastening a hawser to a mooring ring or dolphin is by means of the Fisherman's Bend (Fig. 19). This is also one of the best ways of bending a hemp cable on to an anchor ring. When used for this last purpose it is well to seize the ends as shown in the diagram.

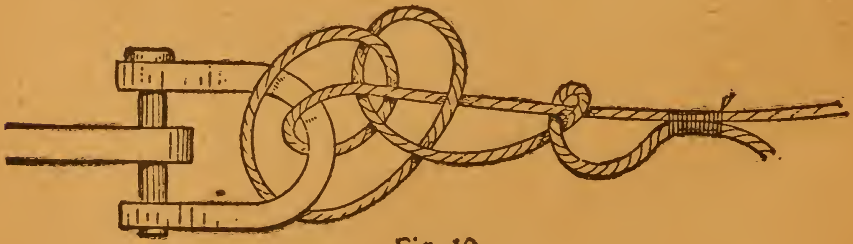
Fig. 19.

New rope, especially manilla rope, is very apt to twist itself up into loops or kinks. This tendency to kink can be prevented by stretching the rope well before using it.

CHAPTER III.

THE THEORY OF SAILING.

Leeway and lateral resistance.—Heeling.—Balancing sails.—Tacking.—Action of rudder.—Longitudinal resistance.—Deep keel or center-board.

Any object floating on the water will have a tendency to drift before the wind; but a boat, with its scientifically constructed hull, sails, and rudder, can be so guided as to sail with the wind on her quarter or abeam, or even close-hauled, as it is called, that is, with the wind meeting her at an angle of about forty-five degrees.

Fig. 20 represents the deck plan of boat sailing close-hauled under two sails. The sails A and B are drawn aft with the sheets till they form an acute angle with the line of the keel. The wind, whose direction is indicated by the arrow W, strikes the sails at a very acute angle, so that they do not shake, but are just full.

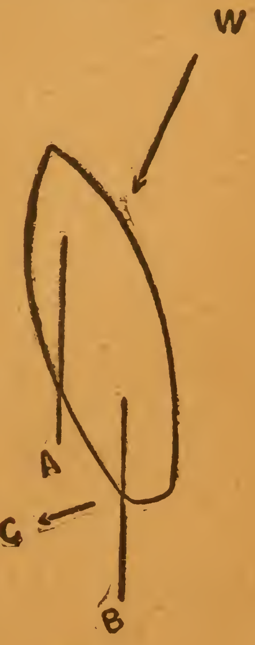

Fig. 20.

The result of this pressure on the sails is that the boat is propelled forward and also sideways away from the wind, making leeway, as it is called.

If a boat has a deep keel her lateral resistance to the water will cause the leeway to be insignificant.

If the boat is of very shallow draught and so offers little lateral resistance to the water, she will not go ahead at all, and the entire force of the wind will be expended in driving her bodily to leeward. Lee-boards and center-boards are fitted to shallow boats in order to obviate this.

The pressure of the wind on the sails, in addition to producing the above effects, heels a boat over. A sailing-boat is so constructed as to resist this tendency to capsize. Either she is made narrow and deep and is weighted with ballast as far as possible below the water line, or she is shallow but of considerable beam. The deep and weighted boat will heel over more readily than the beamy shallow boat, but the further she heels the greater pressure of wind is necessary to make her heel still more, for the leverage of her ballast increases as she heels, and many boats with lead upon their keels are practically uncapsizable. On the other hand, the beamy shallow boat does not heel so readily, but after she has heeled to a certain angle she will capsize.

The pressure of the wind on the sails not only propels, drives to leeward, and heels over a boat, but unless the sails are absolutely balanced it tends to turn her in one direction or the other.

In Fig. 20 we have a boat with two sails. If the after sail is the more powerful it is obvious that the wind will drive round that sail and the stern of the boat with it in the direction of the arrow C, while the head of the boat will run up into the wind. If, on the other hand, the head sail be the more powerful of the two, the bow will be driven off the wind and the boat will bear away.

The sails of a boat should be so balanced that she has a slight tendency to run up into the wind; and to counteract this weather helm, as it is called, the steersman will have to keep the rudder slightly to leeward of the line of the keel.

If a boat carrying weather helm be left to her own devices in a squall she will at once do the right thing, luff up into the wind and be in safety; whereas a boat with too much head-canvas and carrying lee-helm will run off her course and put herself in a dangerous position.

A boat should not gripe, that is, carry too much weather helm, for steering will then be very hard, and the rudder forced far over to counteract the helm, will act as a serious drag in the water.

In balancing the sails it must be remembered that the further out a sail is on an extremity of a boat the greater its effect in driving that end of the boat off the wind.

Sometimes a vessel's sails are not properly balanced because the ballast has not been stowed in the right place. It is obvious, for instance, that if ballast be shifted aft, the weather helm will be diminished, for the stern of the boat will draw more water and so offer more lateral resistance, whereas the stem of the boat will draw less water and will therefore be more easily blown round. A centerboard, again, is generally placed well forward, so it is found that when this is lowered the weather helm of the boat is considerably increased.

We have explained that a boat properly constructed and rigged can sail within forty-five degrees of the wind. Now, if it be desired to sail to some point more directly to windward than this, what is called tacking becomes necessary. This consists of sailing a certain distance close hauled with the wind on one side, and then turning round and sailing close hauled with the wind on the other side. A zigzag course is thus taken, each tack being at about right angles to the last.

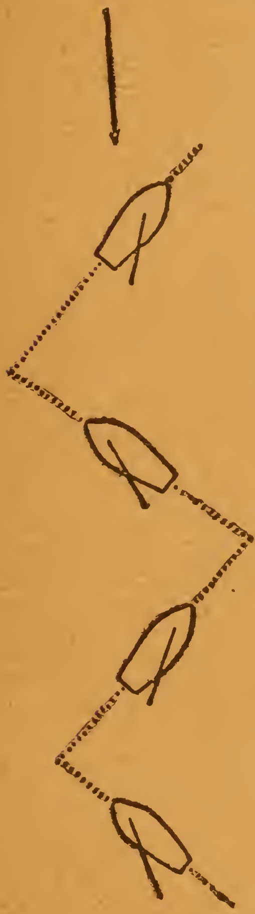

Fig. 21.

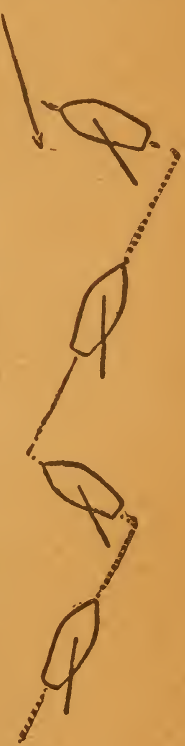

Fig. 21.

One diagram of Fig. 21 illustrates the process of tacking with the wind right ahead, and in the other diagram the wind is a point or two off, so that one tack is longer than the other, there being, in sailor language, a short leg and a long leg.

That the action of the rudder, when forced over till it is at an angle with the keel, is to act as a drag on that side and so deflect the boat's course, is plain enough. But it is not so obvious a fact that this action of the rudder in turning the boat is not to turn her bow round through the water, but to push the stern sideways while the bow is almost at a standstill. For the center of rotation of a boat, that is, the imaginary pivot on which she turns, is always well forward.

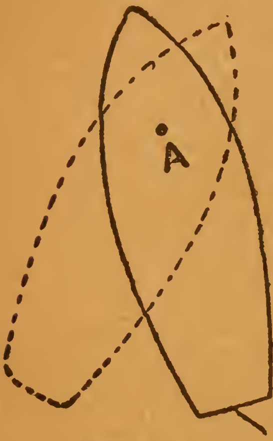

Fig. 22.

In Fig. 22, A is the center of rotation. So when the rudder is put over to the right the boat will revolve on the pivot A till she is in the position indicated by the dotted lines. It will be observed that the stern has moved about twice as far as the bow. The farther forward the center of rotation the greater will this proportion be.

It is very important to remember this effect when sailing very near any object such as a buoy, for while steering so as to turn the boat's head away from the object and avoid it, the stern is made to approach the object, and the very action that seems calculated to prevent a collision may become the cause of one.

Having shown what are the relations of the sails, hull, and rudder of a boat to the wind and water, and explained how a vessel requires either ballast or beam to prevent the wind from capsizing her, and needs draught to increase her lateral resistance and prevent her from being blown to leeward, it remains to add that the longitudinal resistance to the water must be diminished as much as possible. so that the boat can slip easily through the water and travel with speed.

For this reason a sharp stem is put on a vessel. so that she can open a way for herself through the water like a wedge, and she is given what is called a fine run aft, so that her stern will not drag heavily.

Again, the larger the area of the boat's greatest cross-section (Fig. 23) the more resistance that results and the slower she will travel. The area of the cross-section is diminished by making a boat of narrow beam, while the necessary displacement is obtained by increased length and depth.

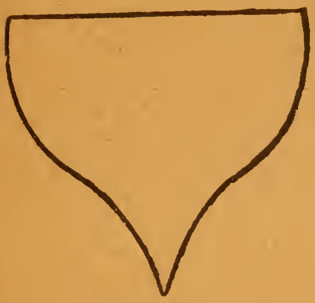
Fig. 23.

Now, the difficulty arises that most of the qualities that insure speed in a boat have a tendency to lessen her stability and even her lateral resistance. It follows that, while constructing a boat, a compromise has to be made between these three; and the problem as to how to produce the fittest craft becomes a very complicated one that has never been solved yet, and probably never will be.

Thus a long narrow shallow boat will run the fastest before the wind, but she will not turn to windward at all, and will capsize with great ease.

As it is recognized that beam is opposed to speed, it has been long the fashion in England to construct racing yachts extremely narrow and of great draught. Such craft do attain speed, but at the expense of all comfort, and when a heavy sea is running go through it instead of over it.

To come to the opposite extreme, we have the flat-bottomed very shallow and very beamy craft, with a deck plan not unlike a flat-iron—a veritable skimming-dish. Provided with a center-board, such a boat is well adapted for shallow and sheltered waters. The center-board can be raised while crossing a shoal, and the boat will then draw only as many inches as a deep-keel boat of her size would draw feet. She will be very fast in smooth water, but in rough water she will pound heavily into the seas, and, having no good hold of the water and little momentum, will lose her headway and soon prove dangerous.

For real comfort and seaworthiness—and some now maintain for racing purposes as well—a boat that is something between these two extremes answers the best; that is, a boat that is moderately beamy and has a moderate draught of water.

Some years ago we sailed to South America in a yacht that well represented the class of vessel we are now speaking of. Her length was forty-two feet, her beam thirteen feet, and her draught seven feet six inches. Not being one of the narrow deep class, she was an excellent sea boat; indeed, she once had the reputation of being the best sea boat of her size in the Channel. Now the advocates of the narrow boats will contend that speed must have been sacrificed to obtain this comfort in heavy weather. We scarcely agree with these gentlemen; for this boat, though furnished with exceptionally small sails, could do her nine knots an hour, and on one occasion traveled two thousand sea miles in ten days.

The author also once owned a center-board yawl of five tons, which drew between two and three feet without her center-board. She thus combined the advantages of the shallow boat with the seaworthiness of a boat that is sufficiently immersed to have a good hold of the water.

This compromise between the deep-keel and the center-board types of boats has long been popular in this country, and probably the recent victories of the American yachts constructed on these principles over the crack deep-keelers will gradually modify the English views on this subject.

Most of the English yachting men maintain that a long hole through the bottom of a boat must weaken her; that the great strain of the center-board, concentrated as it is on one small portion of the keel, must render a large craft thus fitted ill adapted to buffet with a really heavy sea.

On the other hand, the American builders emphatically deny that a center-board is a cause of weakness, and point to our noble pilot vessels and trading schooners, which are all provided with center-boards, and which are exposed to every sort of weather.

It is unnecessary to dwell longer on this controversy, for though there is much divergence of oipnion as regards large craft there can be no question as to the advantages of fitting center-boards into many kinds of small craft, especially in those that are intended for river sailing.

CHAPTER IV.

ON SMALL BOATS.

Open and half-decked boats.—Ballast.---The center-board.—False keels.—Lee-boards.—Counters, square, and pointed sterns.—Battened sails.

The following observations apply chiefly to small boats, which can be rowed as well as sailed, and be easily handled by one man—that is, boats from the smallest size up to about eighteen feet in length.

Open and Half-decked Boats.—A small boat is often half-decked, that is, she is provided with a small deck in the bows and a narrow deck on either side, low coamings being carried round the inside edge. Such a boat must to a certain extent be safer than an entirely open boat; that is, if she be struck by a squall and heel far over, or again, if she run her nose into a sea, the water will flow off her decks instead of pouring into her and possibly swamping her. But a small boat is not a yacht, and she ought not to be sailed in so reckless a manner as to drive her bow or gunwale under and ship large bodies of water in this way. A quite open boat, if she be properly constructed, not over-ballasted, not over-canvassed, and of course properly sailed, will go through an extraordinary amount of sea without taking a bucketful of water on board; and not only this, but she will sail as fast if not faster than the half-decked craft of the same size staggering along under excessive canvas, with the water under her lee coamings. The slight additional safety, or rather inducement to recklessness afforded by the half-deck and waterways, is more than counterbalanced by several disadvantages. In the first place, this deck—too narrow to walk along—will occupy much of the already limited space available on board a small boat, and it will be in the way of and impede one working the sails, or rowing, to an extent that it is difficult to appreciate until one has tried the experiment. In the next place, this deck must be of considerable weight—a serious disadvantage if the boat has often to be beached. And not only is the deck heavy in itself, but, situated as it is high above the water-line, it tends to make the boat top-heavy, and this must be counteracted by putting more ballast into her than would be required in an entirely open boat of the same dimensions. Now, if a small boat is intended ever to venture into rough water, the less ballast she carries and the more buoyant she is the better.

We therefore do not recommend half-decks for the class of boat of which we are now speaking. When a boat is big enough to be a small yacht, and the half-deck forward covers a cuddy large enough to afford sleeping accommodation to the crew, the case is different, and the half-deck becomes a decided advantage.

Ballast.—A small boat's ballast, whatever form it may take, should be readily movable. Thus, if lead is used, it should be cast in small blocks of not more than half a hundred weight each, and in order that it may be lifted with ease, each block should be provided with a handle. Lead being very heavy, and therefore occupying little space in a boat, is the most convenient form of ballast, but it is also by far the most expensive. The iron half-hundred weights with handles at the top, which can be purchased at any marine store dealer's, are nearly as convenient as lead weights, and are very cheap.

Battens should be nailed to the bottom of the boat to keep the ballast in its place, otherwise it might slide to leeward in a squall and cause a capsize.

Stones and bags of sand are often employed as ballast, but water contained in small barrels, or, better still, in metal tanks, shaped so as to fit closely into the bottom of the boat, is far the safest ballast that can be used. For if a boat provided with water ballast capsize and fill she will be no heavier than if she contained no ballast, and consequently she will not sink.

Another advantage of water ballast is that it can be pumped out to lighten the boat when a calm necessitates the use of oars, and be quickly admitted again when a breeze springs up and the sail is hoisted. Again, when the water-tanks are empty the boat is practically converted into a lifeboat, and if a sea fill her she will still float.

The advantages of water over other forms of ballast are so numerous that nothing else would be used in small boats were it not for the great amount of space it occupies; and so serious is this objection that one but rarely comes across a boat thus ballasted.

The Center-Board.—In England the center-board of a small boat is generally of galvanized iron, thus acting also, to some extent, as ballast. In this country wooden center-boards are more often used. If a boat has often to be beached or carried, lightness is an important object, and therefore the wooden center-board is to be preferred. One objection to the center-board is that its trunk or case occupies so much space in the interior of the boat. A telescopic or fan center-board has recently been invented which folds up into itself when hauled up, and therefore requires no trunk. We believe, however, that this is only adapted for canoes and other very small boats.

False Keels.—If the tyro lives by the sea it is very likely that he will commence his nautical career by becoming the proud possessor of some old yacht's dinghy or ship's boat, which, when he puts sail on her, runs before the wind to his complete satisfaction, but is too shallow to turn to windward. Now, to put a center-board into a boat that has not been expressly built for one is an expensive and generally unsatisfactory job, but any carpenter can nail a false keel on to the old one, and so give the boat the necessary draught at a small expense. A false keel should be rounded up toward the bow and stern, and have its greatest depth some way abaft the middle of the boat.

Lee-Boards.—The tyro will find lee-boards even less expensive and possibly more effective than a false keel, and when they are raised the boat will row more easily than if she were provided with the latter. There is some prejudice against lee-boards in England, and to eyes unaccustomed to see them on pleasure craft they appear ugly, but in Holland no boat or yacht is without them.

Large lee-boards are made in several sections, and are strengthened with iron bands, while they require a good deal of gear to support and raise them; but the author has found that with a small boat the following simple method of fitting lee-boards proved very satisfactory.

The shape and position of this lee-board is shown in Fig. 24. It is cut out of one plank and has no iron fittings, and it is between three and four feet in length. The inner side is flat. The outer side, as represented in the diagram, maintains the thickness of the plank at the head and down the middle, and is thence planed away to a narrow edge. A rope is rove through a hole at the head of the lee-board, and passing over the gunwale is secured to a cleat. Another rope rove through a hole at the bottom of the lee-board is led aft, and serves to raise it, while the first rope serves as a pivot. When the lee-boards are not required they

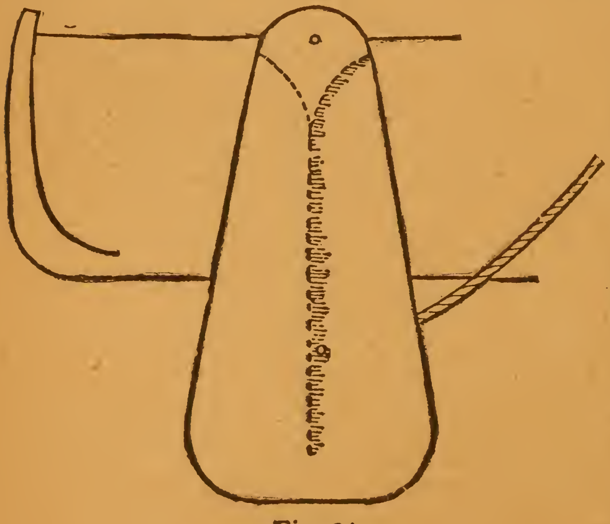

Fig. 24.

can be brought on board and placed at the bottom of the boat. If the boat is wall-sided, that is, has perpendicular sides, the lee-boards can rest against these; but if, as is the case with most boats, her sides fall in beneath, wooden pillows must be fastened on the outside of the boat to support the lee-boards and keep them at the right angle; or, and this is sometimes the better plan, battens of the requisite breadth are nailed on the lee-boards themselves. In working lee-boards the lee one is lowered and the weather one hauled up, and when the boat is running both are raised. All those who are accustomed to the use of lee-boards speak well of them, and they certainly have some advantages over center-boards, notably, that if the boat runs aground they will not bend, break off, or strain the boat, as is often the case with a center-board.

COUNTERS, SQUARE, AND POINTED STERNS.—Whatever it may be on a yacht, a counter or overhanging stern is not an ornament on a small boat, being, as it is, the very reverse of useful; and to the educated eye the useful and beautiful go together in boats, as they do in many other things. In rough water, if a sea strikes a boat under the counter a variety of disagreeable results may ensue; for instance, the boat's bow may be driven under, or she may broach to, that is, be driven broadside on to the sea, and be swamped by the next wave.

A square stern, as is usual in small boats, is far better than a counter; but far better still, for a boat intended to be out in rough water, is the pointed stern. Such a boat is undoubtedly safer, especially when running before a sea, and we maintain that she will be faster as well. All life-boats are thus constructed. Many men dislike a pointed stern, and consider it ugly. However that may be, it behaves handsomely, and we should certainly recommend any amateur building a sailing-boat for coatsing purposes to give her the lifeboat stern.

BATTENED SAILS.—Battens of pine tapering at the ends are sometimes fastened to the reef bands of balance lugs and other sails in use on small boats.

The object of battens is to make a sail stand very flat. Another advantage gained by the use of these is that if one is sailing a boat alone a reef can be taken down in a moment with one hand while the halyard is being slacked off a sufficient length with the other. This is done by means of a line which, when hauled taut, draws the boom and batten close together. It is not necessary to tie down reef points in a sail reefed as above, but to do so makes a much neater reef.

Battens are of great service on the sails of canoes and very small craft, but they make a larger sail somewhat heavy and clumsy to handle.

CHAPTER V.

THE RIGS OF SMALL BOATS.

Spritsails.—Dipping lugs.—Standing lugs.—Leg-of-mutton sails.—The balance lug.—The Una rig.—Balance reefs.—The sloop—Rules of open boat sailing.

The spritsail rig is much used on small boats all around the coast of England. It is an exceedingly handy and safe rig, and the spritsail will set flatter and is better adapted for turning to windward than almost any other form of sail. It has no boom or gaff, but is extended by a long diagonal spar called the sprit, which tapers away at the two extremities, the upper end of it fitting into an eye on the peak, the lower end fitting into a loop on the mast called the snotter. The snotter (see Fig. 25) is a grommet which is placed round the mast, and then seized in the middle so as to form an eye for the sprit.

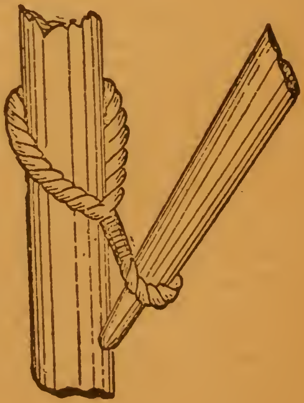
Fig. 25.

In using this rig the sail is hoisted first; one end of the sprit is inserted into the eye of the peak, and then the other end is inserted into the snotter. Lastly, the snotter is pushed up the mast as far as it will go, bringing the sail quite flat. It is well to have a tackle for hoisting the snotter and preventing it from slipping down the mast. It is important that the snotter should be quite sound. There is a great strain on it, and should it break the sprit end may drive a hole through the bottom of a boat or work some other serious damage.

A spritsail can be brailed up along the mast in a moment by means of a line leading through a block on the mat and passing round the sail. A glance at any sailing barge in English waters at anchor, will show how this is done.

An old ship's long-boat provided with a sprit mainsail, sprit mizzen, and jib, as in Fig. 26, is a very convenient sort of craft in which to take one's first lessons in sailing. When it blows hard the mainsail can be stowed, and the boat will sail under jib and mizzen, or these last two sails can be taken in and the mainsail alone be left standing.

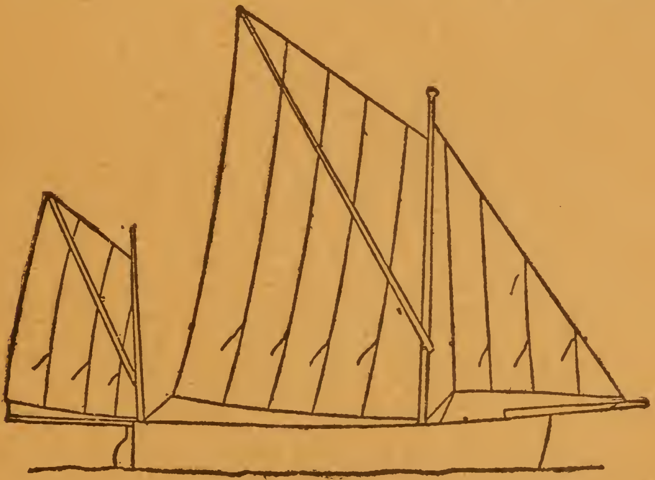

Fig. 26.

The mizzen sheet, it will be observed, is rove through a sheave-hole at the end of a bumpkin, a small fixed spar projecting from the stern of the boat.

The Dipping Lug is a powerful sail very well adapted for sea work, and a favorite with fishermen and other professional sailors, but it cannot be recommended to the amateur; for at every tack the sail has to be lowered and passed round to the other side of the mast. This necessitates plenty of sea room, and would be an awkward operation to undertake while turning up a narrow and crowded channel. To handle a dipping lug with safety in a stiff breeze requires considerable experience both on the part of the steersman and of the hand or hands to whom the dipping of the sail is intrusted.

The Standing Lug, though not so powerful a sail as the dipping lug, is far more convenient; as the sail has not to be lowerd in tacking. The tack, instead of being carried forward, is brought down to the mast, where it is hooked on to an iron hook if the sail be a small one, and if the sail be a large one it is fitted with a tackle, so that the tack can be bowsed down after the sail is hoisted. The yard is swung at about one-third of its length, where it has a strop to pass over the hook on the traveler—an iron ring on the mast to which the end of the halyard is attached, and which prevents the sail blowing away from the mast.

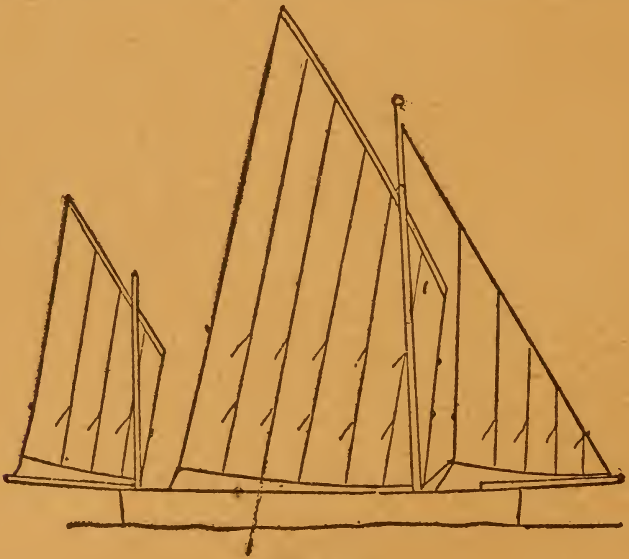

Fig. 27.

In order to insure a lug sail that will stand well, the peak should be cut high, as in the drawing. It is a common fault to cut the head of a lug sail too square. Such a sail can never be made to set flatly. A short, beamy dinghy with one lug is a handy little craft for the amateur, but if the boat is a long one she will be better with a jib and mizzen, as in Fig. 27.

The Leg-of-Mutton Sail.—A very handy rig and one that requires no spars but the masts, is that represented in Fig. 28. The masts though long are slight, as there is little strain on them. Each sail is hoisted to its masthead by one halyard, and its luff is kept close to the mast by hoops or more usually by a lacing. A boat thus rigged is possibly the safest of any, and is not easily capsized.

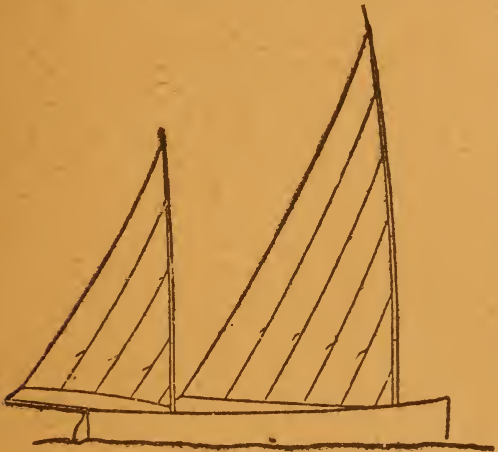
Fig. 28.

The rigs we have so far described are well adapted for a novice, insomuch as they need no booms. As soon as a sail is provided with a boom the danger of sailing is much increased. If you let go the sheet of a sail that has no boom—a spritsail, for instance—it flaps away from the mast innocently like a flag. Put a boom on it, and you at once have a great surface of canvas extended rigidly and offering the greatest possible resistance to the wind. When running before a strong wind a jibe, and especially if it be an unpremeditated jibe, of a sail bent on to a long boom becomes a source of danger.

Thus a green hand or a careless person cannot be safely trusted with a boom sail on a squally day; but when the novice has acquired the rudiments of sailing, and employs that constant caution and watchfulness of his ever-open weather-eye which are indispensable qualities for a sailor, he will most certainly, and very rightly, too, prefer the boom sail. For a sail that has no boom is most unsatisfactory if one wishes to get any speed out of a boat. When running free it curves into a bag, and only presents half its area to the wind. It never stands flat, except when the boat is close-hauled, and not always then, unless the sheet is led exactly to the right place; and though a sail without a boom jibes with greater safety, it is much more liable to accidental jibes than one with a boom.

The Balance Lug.—The favorite sail for small center-board craft in England is undoubtedly the balance lug. Most of the racing boats on the Upper Thames are fitted with this sail; some have jibs, others jibs and mizzens, besides the mainsail; but we will confine ourselves to describing the single-sail center-board dinghy, which little craft is perhaps unrivaled for the purpose of single-handed sailing on a river.

A handy boat is one fifteen feet long, with five feet beam. She should have a flat floor, and therefore shallow draught. The mast is supported with wire shrouds, and is fitted into what is called a tabernacle, that is, a wooden case for the heel of the mast, having a pivot through it, on which pivot the mast is easily lowered when the boat is passing under a bridge.

The sail, as is shown in Fig. 29, is hoisted on a yard similar to that of a standing lug, but the foot of the sail is laced to a boom, and extends some distance in front of the mast. One end of the tack is fastened to the boom, where it crosses the mast, and the other end of it is secured to the mast.

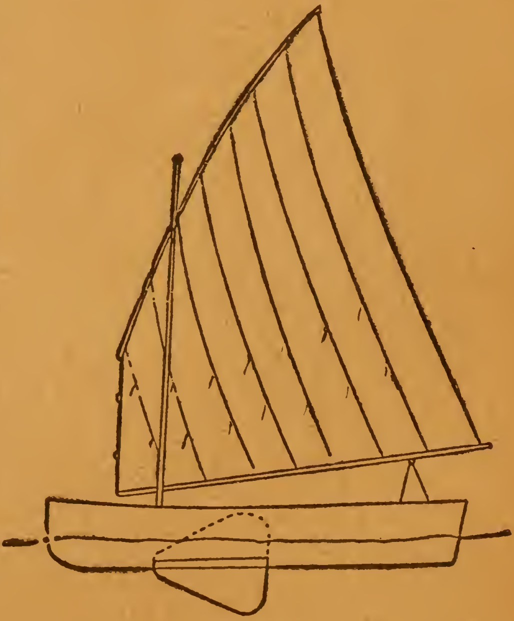

Fig. 29.

The tack is a most important rope in a balance-lug boat, for after the sail has been hoisted with the halyard and it is required to give that last haul on the sail which brings it to its proper tautness, a much smaller amount of power will do this when applied to the tack than if applied to the halyard. An efficient tack purchase is what is known as a watch tackle, which is represented in Fig. 12. When after sailing awhile the ropes have stretched, and the sail is no longer flat, it is with this tackle, and not with the halyard, that one sets it up again. A balance lug requires more frequent setting up to preserve its flatness than any other sort of sail.

In a small dinghy no purchase is needed for the halyards ; the sail will lower more easily and quicker without one. The tabernacle also is unnecessary, as the mast can be easily unstepped.

The sail is kept close to the mast by an iron traveler, but if the sail be cut with a high peak it will be found that the traveler has a tendency to prevent the sail from lowering completely. A traveler is also liable to jam if the mast is not kept well greased.

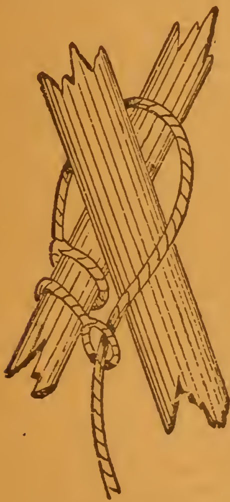

Fig. 30.

On this account the iron traveler is dispensed with on most of the Upper Thames boats, and instead of it a line is fastened to the yard, which passes round the mast and is rove through an eye on the yard. When the sail is up this line is hauled taut, and prevents the yard from blowing away from the mast. This method will be understood by referring to Fig. 30.

A well-cut balance lug properly hoisted should be nearly as flat as a board. The fact of the tack being some way down the boom prevents the pressure of the wind from lifting the after-end of the boom and so forming a belly in the sail, as is the case with the ordinary fore-and-aft sail. A balance-lug is always rigid ; the boom and yard can only move together, and this rigidity renders it somewhat unfit for rough water, where it is apt to considerably strain mast and boat.

The balance lug is rather an awkward sail to lower, and as it is impossible to brail it up, or lower the peak, or trice up the tack to temporarily reduce the canvas in a squall, as can be done with other rigs, the sail has to be lowered bodily if the boat is overpowered by the wind. Thus, if one is overtaken by a violent squall while running before the wind, the balance lug is perhaps the most dangerous sail one can have on a boat.

So as to facilitate reefing a grommet is sometimes placed on each reef cringle at the luff of a balance-lug sail. In taking down a reef the fore end of the boom is thrust into this eye and an earing is thus dispensed with.

The usual method of fitting the sheet of a balance-lug sail is to fasten one end of it to one side of the stern, and then to lead it through a single block strapped on to the boom, and through another block fastened to the other side of the stern.

THE CAT RIG.—Whereas the balance lug is the favorite English rig for small river craft, the Cat or Una rig is generally preferred in this country, and it undoubtedly possesses some important advantages over the other rig.

The cat boat (Fig. 31), being intended for very shallow waters, has the least possible draught. This boat consequently has great beam, and is often quite flat-bottomed. The center-board is of wood or iron. The mast is stepped much more forward than in a balance-lug boat, and carries one large sail laced to a boom and gaff. The cat boat, in our opinion, will turn to windward in smooth water even more smartly than a balance lug. and as a rule will row more easily, for the displacement is very small, and in consequence of the stability given by the great beam, little, and often no ballast is used.

In England it is usual for a cat boat to have but one halyard, which serves to hoist both peak and throat. We prefer two halyards, one for the throat, one for the peak, the latter leading aft, so that it can be let go in a squall, and thus reduce the sail by one-half.

The author had recently a good deal of experience in an eighteen-foot cat-boat among the quays of the Gulf of Mexico and on an extensive lake in Florida, and he came to the conclusion that for such work the cat rig was far handier than the balance-lug, especially when, as was often the case, there was a large party of ladies on board.

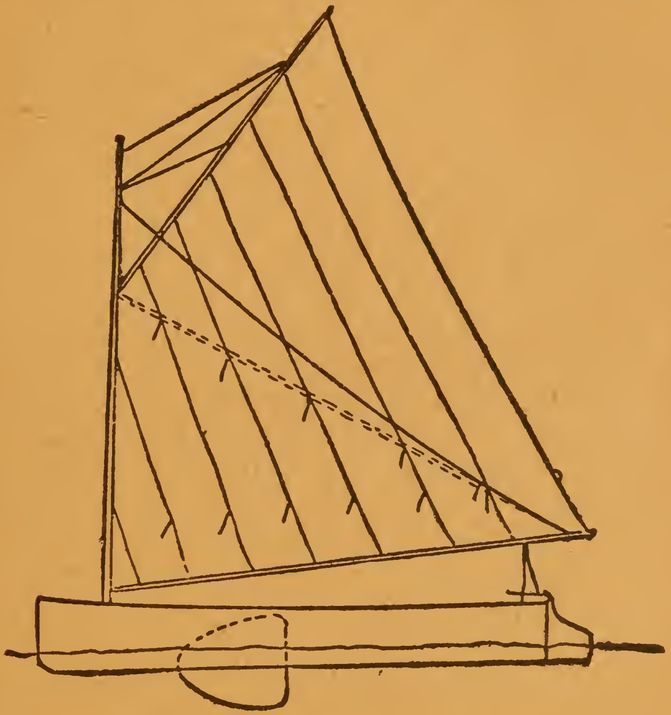

Fig. 31.

This was an entirely open boat, carrying no ballast, and having a wooden center-board. She was therefore very light for her size, and could be rowed with singular ease.

The lake was subject to sudden and violent squalls, and it was very convenient to be able to let go the peak halyards without leaving the tiller, and have them up again in a moment as soon as the squall had passed, without disturbing the passengers in the least. Had the sail been the uncompromising balance lug the whole sail would have had to be lowered in a body on to the heads of the passengers.

A topping lift, always belayed so as to feel the weight of the boom, is indispensable in a cat boat, else the end of the boom would drop into the water when the peak was lowered.

Strong winds would spring up suddenly on this lake, so that the boat would be quite overpowered even under close-reefed sail, and it became impossibe to tack home until the wind dropped. Neither was it possible to row back, for the very lightness of a cat boat renders her a troublesome boat to pull against the wind. She is blown over the surface of the water before the wind, despite all the efforts of the oarsman. Now, as the swamps which surround this lake also made it out of the question to land and walk home, one was liable to find one's self weather-bound among the dismal cypress swamps at the farther end of the lake for three days at a stretch while a "norther" was blowing. The author almost entirely did away with the chance of such an unpleasant adventure by putting what is known as a balance reef into the sail, a plan he strongly recommends to all those who would sail cat boats or small sloops on broad waters liable to sudden storms.

The Balance Reef (Fig. 31) extends diagonally across the sail from the throat to the clews. In taking in this reef the jaws of the gaff are lowered till they touch the boom, and are there tied. The fall of the throat halyards will do for this purpose. When the reef has been taken down and the peak is hoisted again it will be found that the gaff is nearly parallel to the mast, and a very snug little triangular sail is formed, under which the boat will tack or run—with boom well topped up—with safety; and the moment the peak halyard is let go down the sail will fall into the bottom of the boat without making any fuss.

The boat we are speaking of was remarkably cranky, but she would behave well in a strong gale under her balance reef.

The balance reef is much employed by our fishermen and coasters, but scarcely ever on board yachts. I believe that many amateurs consider this, together with some other useful wrinkles, to be "unyachty."

From what we have said it will be seen that the cat rig offers many advantages over its rival, the balance-lug, but it likewise has some serious disadvantages.

The cat boat is not easily capsized—the beam prevents that—but she soon becomes altogether overpowered by sea and wind. Like all flat-bottomed boats, she pounds heavily into a head sea and is very wet. The weight of the mast, being so far forward, makes her somewhat liable to run her nose under water and fill. She steers wildly, too, before a sea, and will broach to more readily than other boats, while the length of her boom renders an accidental jibe dangerous.

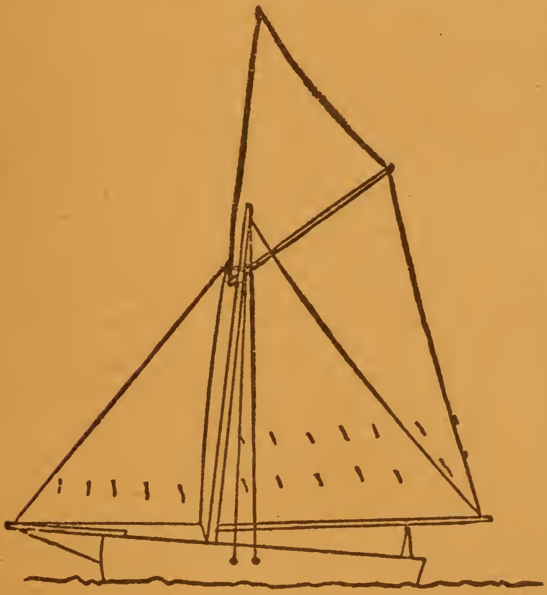

Fig. 32.

THE SLOOP.—Boats and small yachts are often sloop-rigged.

There is considerable discrepancy of opinion as to what constitutes the difference between a sloop and a cutter. At any rate, the generally understood distinction among boating men is, rightly or wrongly, that whereas a sloop's forestay is carried to the end of a fixed bowsprit or an iron bumpkin, the forestay of a cutter is carried to the stem of the vessel; and thus the sloop can only set one large foresail, instead of a foresail and a jib as a cutter does.

We will adopt this definition of a sloop, which is represented in Fig. 32. As the rig is in every other respect the same as that of a cutter, we will reserve an explanation of its different parts till the next chapter, wherein the cutter rig will be discussed.

The sloop rig is not one to be altogether recommended, except for racing purposes on a river. For cruising purposes, if the boat be a small one, one of the rigs above mentioned is preferable to the sloop rig. If the boat be a good-sized one it is better to make a cutter or yawl yacht of her at once; for a sloop's big foresail is an awkward sail to handle in rough weather.

The following important rules apply to the sailing of open boats, such as we have described in this chapter.

Carefully coil your halyards after hoisting sail, so that they will not get entangled and jam if you have to let go in a hurry.

See that your mainsheet is coiled out of every one's way. Many a boat has been capsized owing to a man's leg getting entangled in a sheet.

Do not belay your mainsheet, but hold it in your hand; if the strain be great take one turn with the sheet round a cleat or pin.

Sit to windward while steering.

If struck by a squall luff up to it, or ease the sheet, or do both.

Always luff up in the wind before hoisting or lowering sail.

Never climb the mast of a small boat. If anything is wrong aloft, lower the mast to set it right.

Belay a halyard by taking a few turns round its cleat. Do not put a half-hitch on the top of the turns.

Do not jibe in the middle of a squall, if you can avoid doing so. If a jibe is unavoidable lower your peak first; haul in your mainsheet, and pay it out on the other side, so as to lessen the jerk as the boat jibes.

If it is blowing hard, and all your crew are sitting to windward, remember that a sudden drop in the wind may cause the boat to capsize to windward. Unless your companions are experienced boatmen, do not carry so much sail as to necessitate their all sitting to windward.

CHAPTER VI.

A CUTTER'S RIGGING.

The bowsprit—Backstays—Main halyards—Tack tricing line—Lacing mainsail to boom—Maintack tackle—The gaff—Foresheets—Fore-horse—Jib sheets—Mainsheet-horse—Topsail—Spinnaker—Strops for blocks, etc.—The Yawl—The Ketch.

As this is a treatise on small craft we will speak of the cutter, yawl, and ketch-rigged yachts only, for the schooner rig is only adapted to a larger style of vessel.

With the object of familiarizing the reader with the names of those portions of her rigging common to nearly all boats, we have already, in Chapter I., given a slight description of a cutter. We will now enter upon a more detailed explanation of this rig as applied to craft of under ten tons.

A cutter's bowsprit is not a fixture, as it is on the small boats we have so far described, but is made to slide in and out. It can be run in altogether when no jib is set; and when the large jib—for a cutter should be provided with two jibs at least—is shifted in a breeze for the smaller jib, the bowsprit can be partly run in. It is a great relief to a vessel plunging into a heavy sea thus to relieve her of this overhanging weight.

The bowsprit passes between strong wooden bits on the deck and through an iron ring covered with leather, bolted on the stem, called the gammon iron. When the bowsprit has been run in to the required distance it is kept in its place by the fid, an iron bolt which passes through the bowsprit and the bits.

It is essential that a bowsprit run in easily without jamming, so the gammon iron should be made large, and the fid should be a stout one, else the pressure of the bowsprit will soon bend it, and it will be impossible to draw it out, When the bowsprit is reefed the bobstay and the bowsprit shrouds have also to be shortened and tautened up with the tackle attached to them.

The tack of the jib hooks on to an iron traveler on the bowsprit which is hauled out to the required distance with the jib outhaul.

The backstays or runners (see Fig. 1) support the mast when the vessel is running before the wind. The lee runner must be always slacked out, so that the boom can run out sufficiently far.

Most of a cutter's halyards consist of systems of pulleys giving more or less mechanical advantage as the sail is large or small; but it must be remembered that the more powerful the purchase employed the longer the time occupied in hoisting and lowering the sail and the greater the friction and chance of the halyard jamming, so a purchase that will just enable one hand to hoist a sail with moderate ease is all that is necessary. Small yachts are often over blocked.

For example, a cutter's throat halyards generally consist of a luff-tackle purchase, the double block on the mast and a singe one on the throat; but in a very small cutter a gun-tackle purchase of two single blocks (see Fig. 33) will suffice.

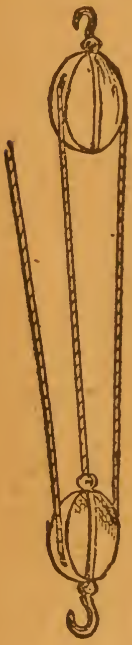

Fig. 33.

A gun-tackle purchase is also generally used for the jib halyards and fore halyards of a cutter under ten tons.

The tack tricing line serves to trice up or draw up the tack of the mainsail and so considerably reduce its size in a squall. It is convenient also to be able to trice up the tack so as to see ahead better while sailing into a crowded harbor. Where the sail is small, the tack tricing line is fastened on to the tack of the sail, passes through a single block on the gaff close to the jaws, and thence leads to the deck. Where the sail is large, a gun-tackle purchase is used.

In large cutters the clew of the mainsail is hauled out on the boom with a traveler and tackle. In smaller boats, where the clew can be hauled out by hand, it is generally permanently lashed to the end of the boom. This plan is apt to pull the sail all out of shape, for if the clew has been hauled out sufficiently taut when the sail is dry, it will be stretched overmuch when the sail is shrunk with rain. Thus, even if no traveler be used, it is well to have the clew lashing so arranged that it can be easily cast off or slackened.

In this country the foot of a cutter's mainsail is invariably laced to the boom. There is some prejudice in England against this method, so far as sea-going boats are concerned. There can be no doubt that a sail sets flatter when its foot is laced, and another great advantage gained is that a much lighter boom can be employed; for the lacing divides the strain throughout the whole length of the boom, instead of concentrating it at the two extremities. The buckling or bending of a boom is also much lessened by this method, and consequently the sail is flatter in a strong wind.

In our opinion the sole objection of any importance to lacing the foot of the mainsail is that in doing so, that very handy rope, the tack trice, must be dispensed with.

The tack of a mainsail is generally hauled down by means of a maintack tackle, generally a luff tackle purchase, but in smaller cutters a short rope spliced into the tack of the sail is sufficient, which can be made fast to the boom or to a cleat on the mast.

The gaff travels up and down the mast on the jaws, which are generally of wood in small cutters. But as the necessary strength is obtained by iron jaws of much less thickness, these are the best; they look neater, fit closer, and the halyards are not so liable to get jammed between them and the mast.

The jaws are prevented from slipping from the mast by the parrel, a line with beads of hard wood threaded on it, which passes round the mast from one horn of the jaws to the other.

The boom is sometimes fitted to the mast with wooden jaws like those of the gaff; but an iron gooseneck, a joint that gives play in every direction to the boom, is far preferable. We will remark here, once and for all, that whenever we mention iron work of any description, we speak of galvanized iron. No other should be allowed on board a yacht under any pretense.

The hoops by which the luff of the sail is kept to the mast are sometimes of iron covered with leather but wooden hoops are preferable for a small yacht, and are less liable to jam.

The simplest arrangement for the fore sheets is as follows: Two single blocks are fastened to the clews of the foresail (a double block may answer as well.) One end of each sheet is spliced into an eye on deck, then the sheet is rove through one of the blocks, and back through a lead to its cleat aft. Fig. 34 illustrates this method.

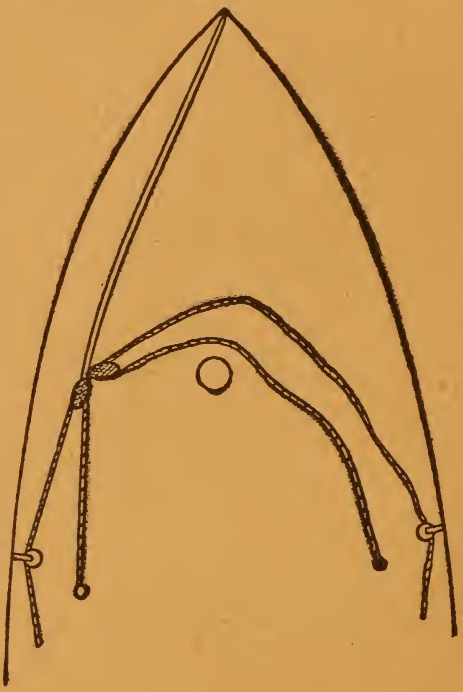

Fig. 34.

A horse for the foresheet is a great convenience on any boat which has decks large enough to work upon. The horse is an iron bar which crosses the deck just before the mast, with a traveler running on it to which the foresheet—only one sheet is necessary when a horse is used—is made fast.

The foresail thus works itself when the vessel is tacked, and there is no danger of its blowing away forward, as there is with the jib and also with a foresail when no horse is employed.

In order to haul the foresail to windward and flatten it in, two bowlines leading aft like fore or jib sheets are employed.

The sheets of the head sails of a small cutter should lead aft and belay to cleats within reach of the helmsman.

The jib has two sheets, one on either side of the mast, one of which is hauled in and the other slackened out, according to the tack the vessel is on.

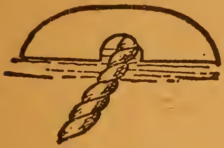

Fig. 35.

When the jibs are small the sheets require no purchase, but each should lead either through a single block on the gunwale or a comb cleat (Fig. 35) on the deck. It is important that this fairlead be exactly in the right spot, for on this depends whether the jib stands flatly or becomes a loose bag. The right spot can only be determined by experiment.

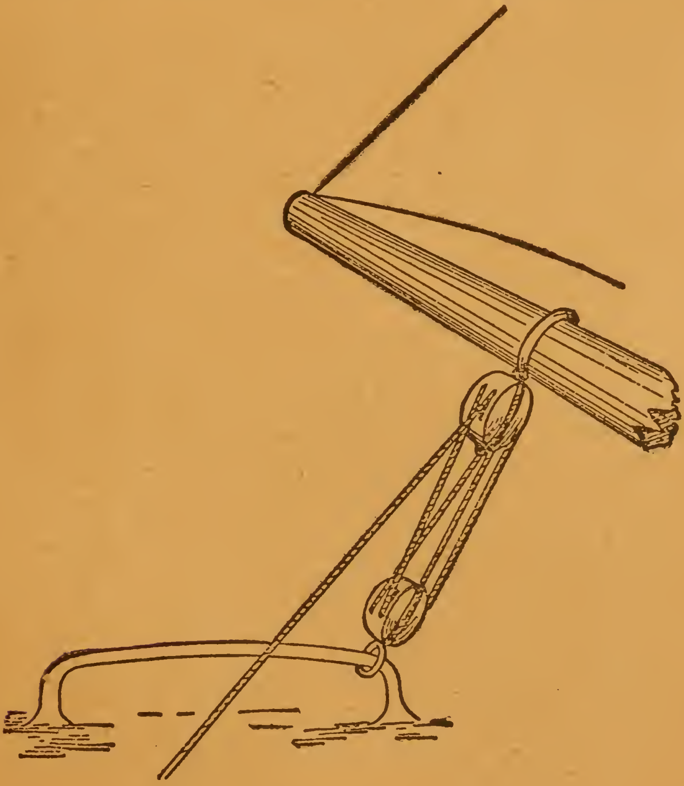

Fig. 36.

Where the bulwarks are high it is sometimes found advantageous for the jib sheets to pass through holes in them.

A knot should be tied at the end of each jib sheet, so that in case the sheet gets loose by accident it cannot escape though the fairlead.

The foresheets require a purchase, more especially when no horse is used.

There are several methods of fitting a mainsheet. It usually travels on a horse, and the advantage of a horse is, that in tacking, the boom is hauled down directly into its right place, and cannot lift and so give a belly to the sail, as is the case where there is no horse. Fig. 36 represents the usual fitting of a mainsheet with horse and two double blocks. For a small cutter one double and one single block—the single block on the horse—would be sufficient, and in a small yawl even two single blocks would do, for it must be remembered that though mechanical advantage is gained by a number of pulleys, friction is increased and time lost. Now it is very important at times that a mainsheet be rounded in or paid out smartly.

The cleat to which the mainsheet is belayed should be as nearly as possible in the middle of the deck or transom, else the boom will have more sheet on one tack than on the other.

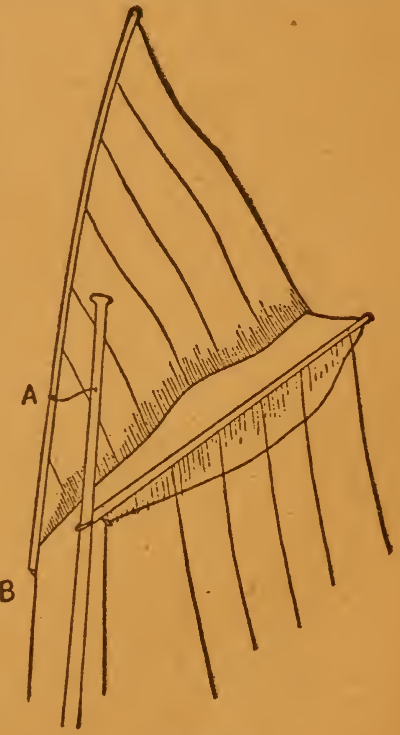

Fig. 37.

It is in our opinion a mistake to put a topmast with its complication of gear into a small yacht, especially as a good-sized topsail can be set without a topmast at all. An inspection of Fig. 37 will show how this is done. In the first place the yard is laid on deck and the sail is laced to it. Then the end of the halyard is bent on to A, a position which has been ascertained by experiment, and which is marked, or better still, has a cleat on it to prevent the halyard from slipping. (See Fig. 18 for the topsail halyard bend.)

Then the sheet, which passes through a sheave hole on the peak and a block under the throat, is bent on to the clew of the sail. Next the downhaul, B, is bent on to the heel of the spar.

The sail is hoisted with the halyard till A is close up to the sheave hole on the mast, and while it is hoisting a slight strain is kept on the downhaul to keep the spar perpendicular. The downhaul is next hauled down as taut as possible and belayed to a cleat on the mast. Lastly, the sheet is hauled in till the sail is quite flat.

A topmast slides through two iron caps on the fore-side of the mast. It is hauled up by the heel rope, which is fastened to the heel of the spar and passes through a sheave hole at the masthead. The topmast, when hoisted, is kept in position by an iron fid. The topmast shrouds are spread out by the crosstrees, of iron or hard wood, projecting at right angles from the masthead. The topmast stay is carried from the head of the topmast to the end of the bowsprit. The topmast is also supported by preventer backstays leading aft. In jibing the lee preventer stay must be slacked out as well as the lee runners.

Two sorts of topsails can be set on a topmast—a yard topsail, by which a large area of canvas is obtained, and a jib-headed topsail. In a good-sized yacht it is well to have both. The jib-header can be used in strong winds. When out at sea in really bad weather it is often of great advantage to set the jib-header over a reefed mainsail, for the wind still fills it, and the steerage way is preserved while the reefed mainsail is becalmed in the trough of the sea. By means of a jackyard, which extends the foot of the sail beyond the end of the main gaff, the area of either a jib-header or a yard topsail can be increased.

When a cutter is running before the wind, a jib-headed sail, called a spinnaker, can be set on the opposite side to the mainsail. (See Fig. 38).

The spinnaker boom is fitted to the fore-side of the mast by a gooseneck, and if the sail is intended for cruising purposes only, the boom should, when topped up along the mast with its topping-lift, be able to pass under the forestay.

The spinnaker halyard passes through a block on the mast, and the clew of the sail is hauled out to the end of the boom by an outhaul, while the tack can be made fast to a cleat on deck.

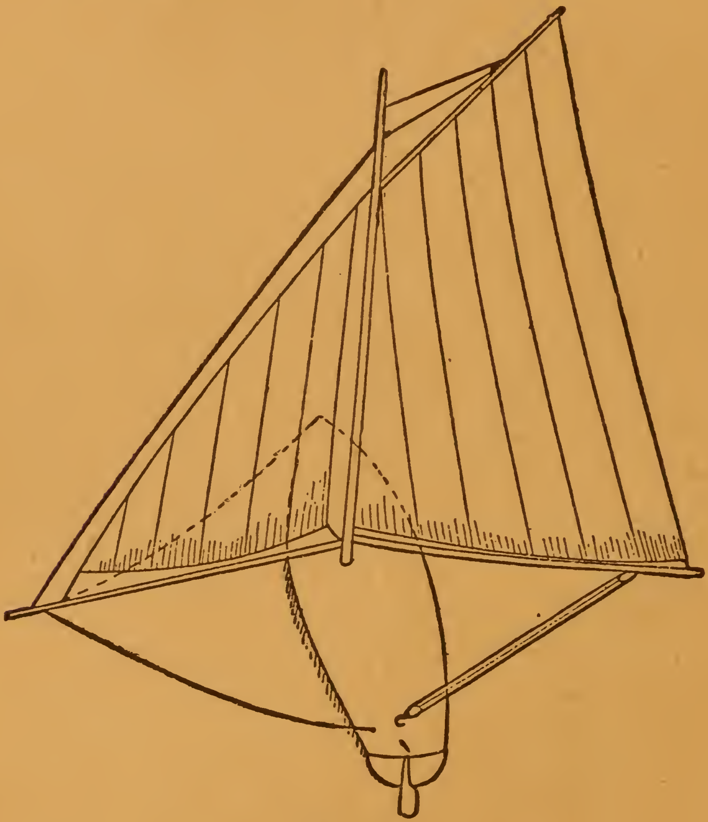

Fig. 38.

In order to prevent the spinnaker boom from swinging fore or aft it is stayed or guyed with a fore guy leading to the stem and an after guy leading to the stern. These guys also serve to trim the boom to the required angle.

Most of the blocks now used on yachts have iron strops to them but it is still necessary that the amateur sailor should know how to strop a block.

If it be a tail block for which the strop is required this can be done by making an eye splice in the piece of rope that is to serve as the tail. The common form of strop is a rope grommet coated with canvas.

The above strops are liable to stretch considerably, and for blocks, such as the mainsheet blocks, which have a tendency to slip out, the author has found that grommets of wire rope make serviceable strops. These, too, should be coated with canvas or leather and afterward painted.

Selvagee strops are now much used for blocks, are very strong, look neat, and are easily made.

To make a selvagee strop, drive two spikes or nails into a board, their distance apart depending upon the size of the required strop. Then make fast one end of a ball of rope yarn to one of the nails, and wind the rope yarn round and round the two nails, hauling each turn very taut until the strop thus formed is stout enough. Tie the yarns together at intervals, and the strop will present the appearance shown in Fig. 39. Leather should always be wet when it is sewn on a strop, for it will shrink when dry and stretch tightly round the strop without showing any wrinkles.

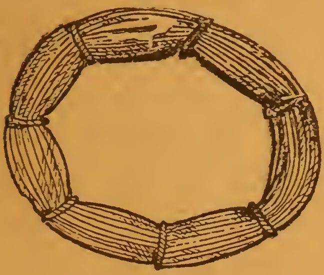
Fig. 39.

The best form of block for yachting purposes is the patent iron-stropped block; the *lignum vitæ* shell being fastened over the strop.

Iron blocks should never be used in a small yacht. They are only necessary on large craft, where chain halyards are employed.

Where a tackle is used, as in the backstay runners, it is advisable that one of the blocks should have a swivel hook. In this way all turns will be taken out of the tackle, and jamming will be prevented.

The difference between a cutter and a yawl is that the latter has not so big a mainsail as the cutter; the main boom does not project over the stern, but is all inboard, thus permitting of a small mizzen-mast being stepped right aft. (Fig. 40.)

A yacht rigged as a cutter will, under most circumstances, be faster than if she were yawl rigged; so, in racing, a yawl is granted a certain time allowance when competing with "single-stick" craft. But for cruising purposes the yawl rig is undoubtedly the most comfortable, the most handy, and requires fewer hands to work it.

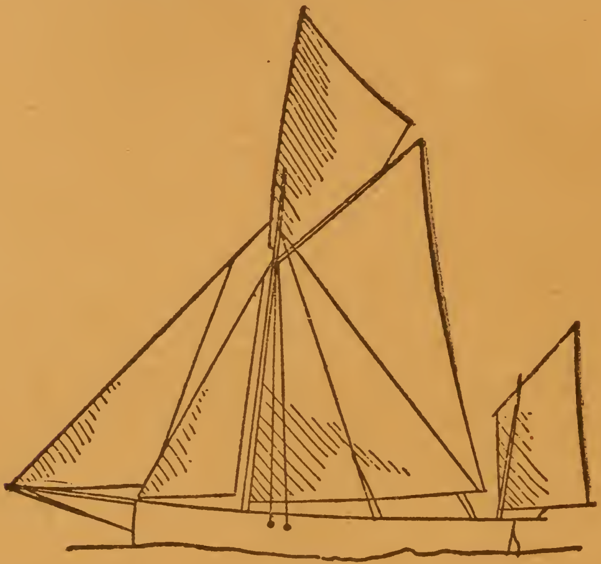

Fig. 40.

A yawl's mizzen is generally a standing lug, sometimes a leg-of-mutton sail; in either case working on a boom with a sheet leading through the end of a short wooden or iron outrigger or bumpkin projecting over the stern.

For single-handed sailing the yawl is much to be preferred to the cutter, as the following examples will show.

Should it come on to blow it is much easier to reef down on the short boom than on the overhanging boom of a cutter.

It is not so often necessary to reef a yawl's mainsail as a cutter's; for, instead of reefing, the mizzen can be stowed and smaller headsail set, or she can be made to sail under mainsail and foresail alone, or under mizzen and foresail alone.

If it is required to take a reef in the mainsail the sail can be lowered on deck and reefed at leisure by one hand; while the vessel, hove to under foresail and mizzen, is allowed to take care of herself. When one is alone on board a cutter, and it becomes necessary to reef, the task is a difficult and often a dangerous one.

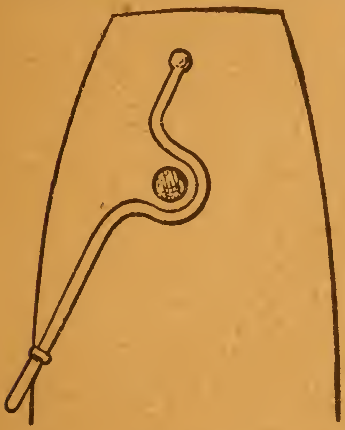

Fig. 41.

As the mizzen of a yawl is sometimes just before the rudder head the tiller must have a curve or loop in it, so as to allow of its being put over to a sufficient angle. An iron tiller is therefore generally used. (See Fig. 41.)

A yawl's mizzen is always a very small sail, and in a large majority of yachts of this rig it appears ridiculously small, and can have only an inappreciable effect on the vessel.

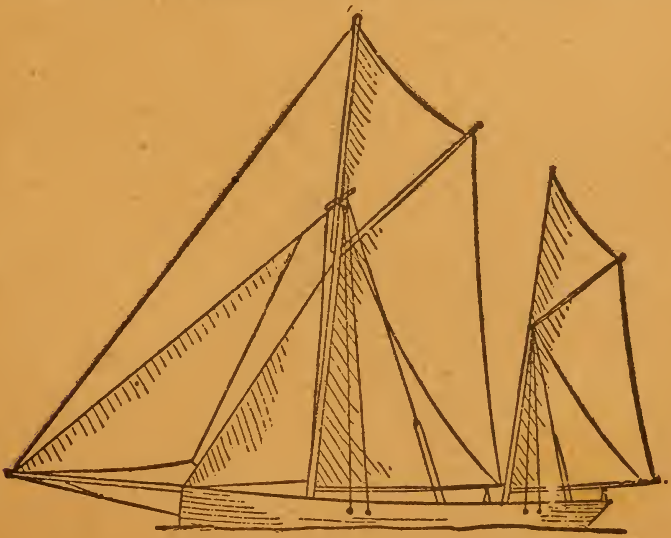

Fig. 42.

But in a ketch (Fig. 42), which differs from a yawl in having a still smaller mainsail and shorter boom, with a mizzen mast stepped further inboard, the mizzen is a much larger and more serviceable sail.

For real cruising on broad seas in all sorts of weather the ketch is the best of all fore-and-aft rigs. It is the rig of many of our coasters, and of nearly all of our deep sea fishing boats. A ninety-ton ketch-rigged fishing smack, such as one may see hundreds of any day tossing about on the steep seas of the Dogger Bank, is as fine a sea boat as any sailor's heart can desire.

No bumpkin is needed for a ketch's mizzen sheet, as the mast is so far inboard; the sheet works on a horse on the taffrail or merely through a block bolted into the deck as far aft as possible.

In coasters and fishing smacks a topsail is set over the mizzen.

All those advantages which the yawl possesses over the cutter are magnified in the ketch, and in addition to this the vessel can sail well under head sails and mizzen, and can turn to windward under these, a performance impossible for the average yawl, with its pocket handkerchief of a mizzen.

Old Peninsular and Oriental and other large steamers' life-boats can be purchased for a few pounds in the London Docks; for it is the custom to condemn them and sell them for what they will fetch after a certain number of years' service—or rather idle rest in their davits—whether they be sound or otherwise.

These boats, generally built of double skins of teak, are marvelously strong, and are perhaps the best sea boats of their size in the world.

The author once timbered and decked one of these boats—thirty feet long by eight feet beam—and converted her into a ketch yacht, in which he recently sailed to Copenhagen and back, encountering plenty of bad weather on the way.

After his experience he can strongly recommend those who desire a cheap, strong cruising boat that will go through almost any sea, to do the same.

As these lifeboats are of shallow draught it will be necessary either to fit a center-board or false keel on the vessel. The author's craft has lee-boards; but he is aware that the amateur will seldom face the prejudice of his yachting friends, professional or amateur, and adopt this simple and very efficient method of stopping his vessel's leeway. But let us tell him that a little double-ended craft of polished teak, with neat, polished oak lee-boards is anything but unsightly, and is the very boat for the Zuyder Zee and shallow Dutch waterways, where no one will ridicule his lee-boards, provided they be properly made.

CHAPTER VII.

HOW TO SAIL A YACHT.

To get under way from mooring or anchorage—Setting sail—Close hauled—Tacking—Missing stays—Waring—Squalls—Shifting jibs—Jibing—Scandalizing mainsail—Hove to—Reefing—Returning to moorings—Running aground.

Each rig has its own little special tricks of sailing differing from those of other rigs, but the main rules are the same for all, and one who has thoroughly grasped the mechanical laws that govern the relation of a boat's sails, hull, and rudder to wind and water, and has learned how to sail one sort of craft, can discover for himself, by reasoning and experiment, what methods must be employed on a boat of a different rig.

Let us imagine ourselves on board a yawl yacht of five tons lying at anchor at the mouth of a tidal river. We will now describe the principal maneuvers that must be employed in getting her under way and sailing her.

To get under way may appear a simple matter enough, yet to do so safely often taxes the skill of the cleverest sailor.

If the wind is moderate, and we have plenty of sea room, and no vessels are brought up near to us, the process is easy. We hoist all sail, haul up the anchor, and by holding the foresheet to windward cant the vessel off in the required direction, then trim the sheets, and away we go.

But supposing that a strong tide is running under us and a fresh breeze is blowing in the same direction as the tide, it will not do to get under way after this fashion, more especially if other vessels are brought up not far astern of us; for the yacht will begin to drag her anchor when sail is hoisted, or at any rate some time before the chain is a-peak; the result being that before she can be canted and gotten under control she will drag astern and get foul of some of the other craft. And even if she does not do this and her sails fill, she will shoot ahead over her anchor and make it impossible to get it up.

Our best method of getting under way under the above conditions would probably be as follows: First the anchor is hove short, so that the yacht is nearly over it. Then the mainsail or mizzen, according to the strength of the wind, is hoisted. Then, while the anchor is being smartly got off the ground and hauled on board, the foresail is hoisted. The tide passing under a vessel while she is at anchor gives her steerage way; so, just before the anchor leaves the ground, the tiller is put over to cant the vessel on the desired tack, the foresheet is trimmed, and thus we get way on our craft without any delay, and are able to avoid the vessels that surround us.

If there is but little wind a strong tide under one, and a crowd of vessels brought up close astern, it sometimes happens that the following method is the only one by which one can get away clear. Let one hand get the anchor up till the chain is nearly straight up and down and the yacht commences to drag slowly. Let him, by giving her chain or taking it in, keep her going thus, never letting her drag fast. As the tide is running by the vessel faster than she is dragging astern she still has steerage way; thus the helmsman is enabled to steer her, so as to avoid the different craft. As soon as she is astern of them and the road is clear the anchor is got on board, the sails are hoisted, and away she goes.

If the wind and tide are in opposite directions, and the tide has most effect on a vessel at anchor so that she rides with her bow against the tide, it is often advisable to heave the anchor short, and just as it comes off the ground to set mainsail or foresail and run before the wind.

Do not set too much sail and get speed on your vessel before your anchor is on deck, or you will get it caught under your stem, and have to luff up so that a hand can clear it.

If a yacht is not anchored, but made fast to a buoy or other moorings, from which one can slip in a moment, the problem of getting under way is much simplified; for one can carry the mooring line to the bow, or to the quarter, or even astern, so as to direct the vessel's head in the desired direction. Then the mooring can be slipped, and sail hoisted simultaneously, and the vessel will get way on at once, and can be steered clear of everything.

The amateur, if he puts his mind to it, will in time be able to reason out the best method of getting his craft under way under every contingency of tide, wind, and surrounding obstacles. The maneuver is often a difficult one; but luckily the novice has generally time to sit down quietly on deck and reason out his method before commencing operations, which is far from the case with most of the maneuvers which have to be performed when one is under way.

While we are on the subject of getting under way we will describe how the sails are to be set.

The mainsail, when furled, is tied up with small ends of rope, called tyers. First cast off the tyers. Then top the boom a little with the topping-lift and slack out the mainsheet. Seize both main halyards together and hoist till the throat is nearly up. Then belay the peak halyards while you swing away at the throat till it is taut, and belay the throat halyards. Then hoist the peak and belay the peak halyards. Then coil the halyards neatly close under their cleats.

After coiling halyards always capsize them, that is, turn them over so that the end of the halyard is under the coil. If this precaution is not taken, and a sail is lowered in a hurry, the coil will probably be dragged up to the masthead, possibly jam somewhere in a block, and prevent the sail from lowering further until some one has gone aloft to undo the mischief.

Having now gotten our boat under way—say under mainsail and foresail—we proceed to hoist our other sails as we sail close-hauled down the river. It is blowing fresh, and there is a look of more wind in the sky, so we will dispense with the topsail (the method of setting this sail has been already described), and get the mizzen and second jib on her. We are supposing that there are three jibs on board, so the one we have decided to use is the medium one.

The method of setting the jib requires some explanation. In the first place, we take it for granted that the bobstay and bowspit shrouds have been hove taut before we got under way.

Lay the jib on the deck forward with its tack ahead. Hook the tack on the traveler, and the jib halyard on to the head, and then fasten the jib sheets on to the clew. The jib sheets are often attached to the sail on a small yacht by spring hanks; but these are somewhat liable to become unhooked when the sail is shaking in stays. Sister hooks, which must be seized together with yarn—moused, as the operation is called—or have a stout india-rubber ring around them are preferable. Toggles and shackles are also sometimes employed for this purpose.

The jib is now all ready for hoisting. First haul out the tack on the traveler to its proper position, and belay the outhaul. If the jib is a biggish one and may touch the water while it is being hauled out, hoist on the halyard at the same time just sufficiently to keep the jib clear of the water. When the outhaul is belayed, hoist the halyards taut and belay them. Then trim in the lee sheet.

We are now close-hauled, sailing full and bye, as it is called, that is, the sails are full while the vessel is sailing as near to the wind as she can.

The steersman should stand on the weather side of the vessel. To sail a yacht to windward with the greatest advantage requires considerable practice, and the novice is sure at first to yaw her about a good deal, now keeping her off the wind too much and now luffing till all the sails are shaking and she loses her way.

The burgee or vane at the masthead will tell him when he is bearing away too much, and the luff of the mainsail will shake when he is sailing as close as he should.

The luff of the mainsail is generally lifting slightly when a yacht is sailing close hauled; but the best way of steering full and bye is by the feel of the wind on one's face; and this is of course the only method of doing so on a dark night.

We have now come to a bend in the river where the wind heads us, so it becomes necessary to tack. The helmsman sings out "Ready about!" and the crew stand by ready to tend the jib and foresheets. The helmsman keeps the vessel a point or so off for a few moments, so as to give her plenty of way; then singing out "Helm's a-lee!" puts the tiller slowly down—slowly, be it remembered, and not too far down.

The vessel now shoots up into the wind, the jib sheet is let fly, the foresail still kept to windward helps to pay the vessel off on the other tack. The jib sheet on the other side, which now becomes the lee jib sheet, is trimmed in as soon as the vessel is turned sufficiently around. If the jib sheet be hauled in too soon, the jib becomes a back sail, and will cause the vessel to miss stays. Next the foresheet is passed over, and the yacht is rushing away on the other tack. The mainsail and mizzen have been taking care of themselves during this operation; but, if it is blowing hard, it is well to haul in the mainsheet and ease it over gently. If the yacht be a smart one in stays, it is not necessary to keep the foresheet to windward while tacking; jib and foresheet can be let go together.

A small amount of clumsiness in tacking a vessel will cause her to miss stays and get in irons—that is, she will lie up in the wind, all her sails shaking, and refuse to fill on either tack. She has now lost all headway, and commences to go astern. In order to get way on again, haul the head sheets to windward, which we will suppose is the port side. Put the tiller to starboard. As the vessel is going astern, the rudder will now produce the reverse effect of what it would were the vessel going ahead; so putting the tiller to starboard turns the vessel's head to starboard.

To assist her still further in paying off, slack out main and mizzen sheets; for these sails have a tendency to keep her up in the wind. When she has paid off sufficiently, trim the sheets, and she will soon gather way on the port tack.

Sometimes, in a choppy sea, a boat will refuse to stay, and it becomes necessary to ware her. To do this, slack out the mainsheet and bear away till the wind is brought on the other side and the sail jibes. Then luff till the vessel is close hauled.

While tacking in a river, with the tide under one, it must not be forgotten that close under either shore there is generally much less current than in the middle of the river, sometimes no current at all or even a back eddy. The yacht must therefore not be taken in too near the bank before going about, for then her bows will be out of the tide while her stern will be in it; the pressure on her stern will prevent her coming up in the wind when the helm is put down, and she will consequently miss stays.

While we are tacking down this reach, the wind freshens a lot, and we are struck by several squalls, to which the helmsman luffs up, thereby lessening the force of their impact; but he must be careful not to luff too much or too long, else the yacht will lose all her way and get in irons.

It blows still harder, and our vessel is running her nose into the short, choppy sea, so it is decided that we shift the second jib for the third or smallest.

To do this properly while one is under way requires an experienced hand. To take in the jib, let go the outhaul, and as the sail on its traveler comes inboard along the bowsprit, muzzle it, that is, clasp it in your arms; then letting go the halyards, pull the sail down on deck to leeward of the foresail. Untoggle the sheets, unhook the tack and head from the outhaul and halyards; secure these last to their respective cleats, so that they cannot blow a drift, and then carry the sail below. Get the third jib on deck, and set it in the way before described.

If we had been out at sea instead of taking a short sail on a river, we should have reefed the bowsprit when we shifted jibs, and thus have relieved the vessel of the unnecessary leverage of this weight over her bows.

In the next reach, the river bends around so that we have to put the helm up and run before the wind. The lee-runner is slacked off and all the sheets are eased off.

Further on, the river bends around still more, so that we have to jibe. As the wind is strong, this must be done with certain precautions. First the peak is lowered. Then the runner is slacked off and the helm is put up. The main sheet must be rounded in quickly till the boom is amidships, and then, as the wind strikes the sail on the other side, the sheet is paid out again. If the boom were allowed to jibe over by itself, and the mainsheet was not thus made to break the violence of the jerk, the boom would be sprung or some other serious accident would probably occur.

When the boom has jibed over, the runner which is now the weather one is set up taut and the head sheets are slacked out on the weather side and belayed on the less side.

In the next reach, the wind is a little before the beam, so the sheets are trimmed in a bit.

So stiff a squall now strikes us that our lee gunwale and several planks of our deck are under water; so, until it is over, the mainsail is scandalized. Scandalizing a mainsail consists of tricing up the tack and lowering the peak, thus much reducing the area of canvas.

The squall over, we hoist the peak and lower the tack again. The man at the tiller now complains that in this strong wind "the vessel is carrying enough weather helm to pull his arms off." The cause of this griping, as it is called, is plain enough. When we got under way our sails were nicely balanced, and the yacht steered easily with just a slight weather helm. But we have shifted the second jib for the third, thus reducing the head sail so much that the after sails are producing the most effect, and a lot of helm is necessary to counteract the vessel's tendency to run up into the wind. (See Chapter III., on the balancing of sails.) We must now restore the proper balance of the sails by reducing the after sail. We can do this either by taking in the mizzen or by reefing the mainsail, and as the wind looks more like freshening than moderating, we decide to take down one reef in the mainsail.

In the first place we heave our vessel to. To do this we slack away our lee foresheet and haul in the weather one, while we flatten in the main and mizzen sheets.

The wind striking the after sails drives the vessel up in the wind; but the foresail being hauled to windward and becoming a back sail makes her pay off. By trimming the sheets properly the head and after sails can thus be made to balance each other, and the yacht will float on the water practically motionless, with her head to the wind, and remain so for as long as we please without any hand being required at the tiller.

We next lower the mainsail on deck, and remain hove to under foresail and mizzen. Having now much less after sail set, we must let the jib sheet flow and, perhaps, give the foresail a trifle more sheet to prevent our vessel from paying off too much.

And now to take down our reef. If the reef-pendant is not already rove, as it always should be on a short-handed craft, we proceed to reeve it. Fig. 43 will demonstrate how this is done. The boom has a comb cleat on either side of it. As we wish to take down only one reef, we reeve the pendant through the first hole of one of these cleats, a knot at the pendant end preventing it from slipping through. Then we pass it through the first reef cringle and down through the first hole of the other comb cleat.

Now we haul on the pendant till we have boused down the cringle to the boom, and then lash it securely.

Next the tack is secured to the first reef cringle on the luff of the sail, the foot of the sail is rolled up, and the first row of reef points are tied.

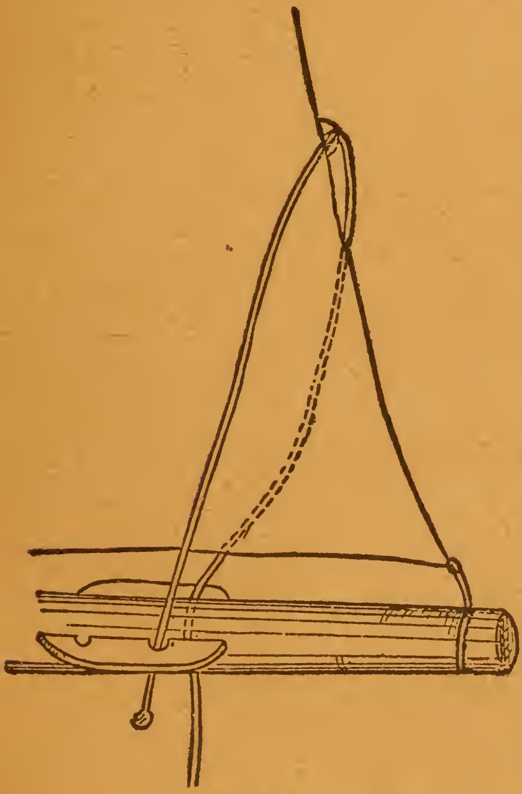
Fig. 43.

Having got our reef down, we hoist up our reduced mainsail, slack out the main and mizzen sheets to let the vessel pay off a bit, then let go the weather foresheet and haul in the lee one and proceed on our voyage. The sails are now nicely balanced again, and the man at the tiller no longer grumbles at the arm pulling weather helm.

In the next reach the wind is ahead, and we have to tack again; but the tide has turned and is running strongly against us so that we find we are making no progress. We therefore, decide to return home. The helm is put up, the mainsheet is eased off, and we bear away to run up the river.

By-and-by we are close-hauled, and we observe that our sails are standing very badly, the jib especially so, for its luff is bending around in a great bow.

The cause of this is that our ropes have stretched, and a pull on the halyards all around becomes necessary. While the steersman luffs for a moment so that the sails shake, a hand swings down the jib halyards and belays them. So again while a pull is being taken on each halyard in its turn, the steersman luffs up, thereby relieving the sail of the pressure of the wind, but without stopping the vessel's way.

And now we approach our moorings; the tide and wind are both with us. We lower our head sails, steer the yacht so that she takes a sweep around into the wind, and we haul in the mainsheet as she comes up. We bring her up head to wind, and she loses her way just as we are alongside the mooring buoy. A hand forward picks up the buoy rope with a boat hook and secures it. Then the mainsail and mizzen are quickly lowered, and we stow the sails at our leisure.

The method here described is the most usual one of coming up to moorings.

To perform this maneuver with confidence requires considerable experience. The moment at which the vessel should be luffed up into the wind and the nature of the curve she should be made to describe depend on a variety of circumstances. The strength of the tide must be taken into consideration, and also the tendency of the boat either to shoot far ahead or lose her way quickly after she has been luffed up into the wind.

A very slight mistake will bring the vessel up short of her moorings. Then, having lost her way, she will drop astern with the tide and possibly get foul of some other craft before head sail can be set and way can be gotten on her.

We would therefore recommend the novice to always have his anchor ready to let go when approaching his moorings.

When the wind and tide are in opposite directions the maneuver is sometimes rendered easier; for then the vessel can be made to run before the wind up to her buoy under her mainsail, and then, the sail being scandalized, she will no longer be able to stem the tide, but will come to a standstill close to the buoy.

If the wind is strong, she can run up under her foresail only, which can be lowered as soon as the buoy is reached.

To come to an anchor, the usual method is to lower the head sails, haul in the mainsheet, and luff the vessel up into the wind till she stops her way; then let go.

Before coming up to the anchorage a few fathoms of chain should be ranged before the windlass, sufficient at least to allow the anchor to reach the bottom when let go.

It is best not to let go the anchor until the vessel has begun to gather stern way; then give her chain gradually until she has taken out enough—that is, under ordinary circumstances, about three times as much length of chain as the depth of the water. If the chain is allowed to run out all at once it will fall on the top of the anchor, a coil will get around one of the flukes, dislodge the other fluke from the ground, and the vessel will drag.

The end of the chain, especially if no windlass is used, should be secured to a bolt in the chain locker or otherwise; else a careless hand may let it all run overboard and thus lose both anchor and cable.

The chain should be marked at every five fathoms, by attaching a small piece of cord to the link. The loose end of the first cord can have one knot tied in it, the second cord two knots, and so on. The length of chain that is overboard is thus easily ascertained.

Our vessel being now moored or anchored, we neatly stow our sails, fasten the tyers around them, belay all halyards and sheets, and coil the mainsheet and the other falls. If the ropes are dry, belay them slack, for a shower would shrink them, and if they were belayed taut all the life would be stretched out of them.

When a vessel has run aground, the method of getting her off again varies with circumstances.

If the keel is in soft mud and we were not running before the wind when our vessel struck, we may get her off by slacking the main and mizzen right out, so that the wind does not press on the sails, or by lowering the mainsail and mizzen, while we haul the head sheets to windward, so that the head sails turn her bows around and drive her astern at the same time. If this is not enough to move her, we can assist the action of the sails by shoving her off with poles; also by making our crew run from side to side to roll her and so dislodge her keel from the mud; or, if she is only aground forward and the rest of her is afloat, by bringing the weight of all hands aft and so lightening the bows.

But if she has run upon a sloping shoal of sand or shingle, the above method will seldom prove of any avail, for the opposition of the hard bottom will prevent the keel from turning. Under these circumstances, our only plan will be to lower all sail and drag her off by the same way that she came on, that is, we must shove her astern with the poles and if that is not sufficient, take an anchor out in the dinghy and let it go in the deep water some distance astern, when we can haul her off with the cable. If the anchor holds well, we can—in case our own strength is insufficient—clap a watch tackle on the cable or pass it around the windlass so as to gain more power.

If we were running before the wind when we got aground, we must in this case also lower all sail and haul the vessel off stern first.

If the tide is dropping, there must be no delay in getting her off, or the water will leave us, and we will have to remain where we are till the next flood.

Be careful not to run aground on the top of high water spring tides, or you may be neaped as it is called—that is, you will not have water to float you off unil the next springs, and must remain stuck in the mud for maybe a fortnight.

While sailing a small craft, if you pass close under the lee of a large vessel, you will find that she will take all the wind out of your sails and you will be becalmed. Look out, if the day be a breezy one, for the sudden blow with which the wind will strike you again when the vessel is passed. As your vessel will probably have lost nearly all her way while under the lee of the other, the first pressure of the wind will be entirely exerted in heeling your craft over.

Therefore lower your peak, or have your sheets ready to slack out while under the lee of the other vessel.

The spinnaker is the only sail on board our yawl whose management has not been described. When not in use, the spinnaker boom is topped along the mast, and secured by lashings to the shrouds. To set the spinnaker, cast off the boom lashings. Lower the boom over the side, keeping it still well topped up. Guy it with the fore and the after guys. Bend the outhaul and halyards on the sail. Belay the sheet loosely. First haul the sail up with the halyards. Then haul it along the boom with the outhaul. Then trim in the sheet.

Before we leave the subect of handling a fore-and-after, we will point out that if a vessel be sluggish in stays, it is advisable, instead of leaving the foresheet fast and keeping the foresail aback till the vessel has paid off on the other tack, to let fly the foresheet as the vessel comes up into the wind, thus taking the pressure off the head sails and making her come up the quicker; then, as soon as the vessel is in the wind's eye, to haul the foresheet in again, so that the foresail to windward helps the vessel around. Keep it to windward no longer than is necessary; then, as before, let fly the weather sheet and trim in the lee.

CHAPTER VIII.

MISCELLANEOUS HINTS.

Towing a dinghy—Berthon boats—To prevent a dinghy bumping against an anchored yacht· Foul anchor—Mooring—The drogue—The management of open boats in a heavy sea—Management of a yacht in a rough sea—Boarding—Inventory.

In the last chapter we have described the principal maneuvers that must be employed on a small yacht. This chapter will contain a variety of wrinkles connected with the management of a yacht or boat which may be of service to a novice.

Towing a Dinghy.—If a yacht is running before a high sea, a dinghy towing astern is apt to rush violently down upon the yacht at intervals and possibly stave herself in. Some give a dinghy a long scope of painter under these circumstancs, so as to keep her far astern out of the way. But the long painter allows her more play, and if she does swoop down upon the yacht and strike her it will be with far greater force than if the painter were short. The best method in rough weather, is to tow the dinghy with two very short painters, one to either quarter of the yacht, while an iron half-hundred weight is lashed to the floor of the dinghy close to her stern. This weight steadies her so that she steers straight, does not yaw about, and does not run down upon the yacht. The short painters keeps her nose right out of the water so that she cannot be swamped. If a sea fills her it will almost all run out over her stern again. Overhanging counters have caused the destruction of many dinghys.

Few small yachts have accommodation on deck for a wooden dinghy. A Berthon collapsible boat, which can be easily stowed in the cabin or laid flat on deck is therefore a great advantage for a small craft. For, however safely a dinghy may tow astern, she greatly impedes the speed of the yacht.

When a yacht is lying at anchor with her dinghy afloat, it often happens that the wind and tide being opposed to each other, now one and then the other influences the dinghy most, so that she wanders in erratic fashion as far as her painter's length will allow, now scraping along the yacht's sides, and now thumping into her stern, much to the damage of the new paint.

The patience of the novice is often severely tried by such tricks on his dinghy's part. Half a dozen times in the night he leaves his snug berth and leaps on deck to shift the dinghy's painter from one part of the vessel to the other, first to one side, then to the other, then to the bows, and then back to the stern again, but all to no avail, for as soon as he has turned in, the dismal "thud," "thud" recommences.

If the yacht be a large one, and the bowsprit be therefore sufficiently high above the water, the dinghy's painter can be made fast to the bowsprit end, and the dinghy will thus keep clear of the yacht. But if the vessel is a small one and this plan is not practicable, the following method generally proves successful. Drop an iron bucket with a line attached to its handle over the dinghy's stern. The bucket sinking in the water will offer so much resistance to the tide that the dinghy will ride to the tide only, and the wind will not have power to blow her over the tide against the yacht's sides.

Foul Anchor.—If a yacht is at anchor in a tideway, the slack of the chain is very liable to get around the anchor and foul it when the vessel swings at the turn of the tide. It is therefore, advisable to get in the chain at slack water until the yacht is right over her anchor. As soon as the new current has set in and the yacht has swung to it, the necessary amount of chain can be given her.

Mooring.—If it is blowing hard, or the holding ground is bad, it may be necessary to moor—that is, to ride to two anchors in different directions. Having come to with one anchor, pay out chain and let the vessel drop astern until you have out twice the length of chain you intend to ride by. Then let go the other anchor. Slack out the last anchor chain and heave in that of the first till the same scope of chain is on each. Moor with open hawse toward the direction from which the greatest pressure of wind or current is expected—that is, with a line drawn between the two anchors opposite that direction.

The vessel in swinging around to the tide may get a foul hawse—that is, one chain may take turns over the other. By steering the vessel, setting a sail, or by other means adapted to the particular circumstances, so tend her while she is swinging at each turn of the tide that she never makes a complete revolution, but swings backward and forward in the same semicircle. Foul hawse will thus be avoided.

To Unmoor.—Heave in on one anchor and pay out chain to the other, get the first anchor on board, then heave in on the other anchor. To ride easily in heavy weather put rope springs on the chain cables.

A coir rope makes an excellent cable for a small yacht. It floats on the water, and has plenty of spring in it, so that the yacht rides very lightly.

The Drogue.—When a small yacht cruises on broad and stormy seas such as the North Sea, it is advisable to have a drogue or deep sea anchor among her inventory. Many a small fishing-boat has been saved from destruction by this precaution.

A drogue is a conical bag of stout canvas sometimes having its mouth bent on to an iron ring. When a little craft is far from the land and so high a sea is running that she cannot sail or even lie to with safety, the drogue is attached by a bridle to a hawser and let go over the bows like an anchor. It offers so much resistance to the water that as the vessel is driven astern by the wind the strain on the hawser keeps her head to wind and sea, and she rides safely and easily. A tripping line is attached to the pointed end of the drogue so that it can be capsized and easily hauled on board.

If an open boat is being pulled across the breakers on a bar so as to make a harbor, or is being rowed toward the shore before a heavy surf, a drogue or even a bucket towed astern will keep the boat's stern back and prevent her from broaching to.

If a small boat be blown right out to sea and it is impossible to bring her back to the shore either by rowing or sailing, a floating anchor can be made by lashing the oars, the mast, and the yard with the sail bent on it, together. The sail must be loosed and a weight can be attached to its foot so as to sink it and offer more resistance to the water. A short rope secured to both extremities of the raft forms a span to the middle of which the cable is bent. Such a floating anchor breaks the sea in a marvelous manner, and small boats have been often known to ride out the most furious gales in this way.

I. In Rowing to Seaward.

As a general rule, speed must be given to a boat rowing against a heavy surf. Indeed, under some circumstances, her safety will depend on the utmost speed being attained on meeting a sea. For if the sea be really heavy, and the wind blowing a hard on-shore gale, it can only be by the utmost exertions of the crew that any headway can be made. The great danger then is, that an approaching heavy sea may carry the boat away on its front, and turn it broadside on or up-end it, either effect being immediately fatal. A boat's only chance in such a case is to obtain such way as shall enable her to pass, end on, through the crest of the sea, and leave it as soon as possible behind her. If there be rather a heavy surf, but no wind, or the wind off shore, and opposed to the surf, a boat might be propelled so rapidly through it that her bow would fall more suddenly and heavily after topping the sea than if her way had been checked; and it may therefore only be when the sea is of such magnitude and the boat of such a character that there may be chance of the former carrying her back before it, that full speed should be given to her. It may also happen that, by careful management under such circumstances, a boat may be made to avoid the sea, so that each wave may break ahead of her; which may be the only chance of safety in a small boat; but if the shore be flat, and the broken water extend to a great distance from it, this will be impossible.

II. On Running before a Broken Sea, or Surf, to the Shore.

The one great danger, when running before a broken sea, is that of broaching to. To that peculiar effect of the sea, so frequently destructive of human life, the utmost attention must be directed. The cause of a boat's broaching to, when running before a broken sea or surf is, that her own motion being in the same direction as that of the sea, whether it be given by the force of oars or sails, or by the force of the sea itself, she opposes no resistance to it, but is carried before it. Thus, if a boat be running with her bow to the shore and her stern to the sea, the first effect of a surf or roller overtaking her is to throw up the stern, and as a consequence to depress the bow; if she then has sufficient inertia (which will be proportioned to weight) to allow the sea to pass her, she will in succession pass through the descending, the horizontal, and the ascending position, as the crest of the wave passes successively her stern, her midships, and her bow, in the reverse order in which the same positions occur to a boat propelled to seaward against a surf.

This may be defined as the safe method of running before a broken sea. But if a boat on being overtaken by a heavy surf, has not sufficient inertia to allow it to pass her, the first of the three positions above enumerated alone occurs—her stern is raised high in the air, and the wave carries the boat before it, on its front, or unsafe side, sometimes with frightful velocity, the bow all the time deeply immersed in the hollow of the sea, where the water being stationary, or comparatively so, offers a resistance, while the crest of the sea, having the actual motion which causes it to break, forces onward the stern or rear end of the boat. A boat will in this position sometimes, aided by careful oar steerage, run a considerable distance until the wave has broken and expended itself. But it will often happen that, if the bow be low, it will be driven under water, when the buoyancy being lost forward, while the sea presses on the stern, the boat will be thrown end over end; or if the bow be high, or if it be protected by a deck so that it does not beome submerged, that the resistance forward acting on one bow will slightly turn the boat's head, and the force of the surf being transferred to the opposite quarter, she will in a moment be turned around broadside by the sea, and be thrown by it on her beam ends, or altogether capsize. It is in this manner that most boats are upset in a surf, especially on flat coasts, and in this way many lives are annually lost. Hence it follows that the management of a boat, when landing through a heavy surf, must, as far as possible, be assimilated to that when proceeding to seaward against one, at least so far as to stop her progress shoreward at the moment of being overtaken by a heavy sea, and then enabling it to pass her. There are different ways of effecting this object:

1. By turning the boat's head to the sea before entering the broken water, and then backing in stern foremost, pulling a few strokes ahead to meet each heavy sea, and then again backing astern. If a sea be really heavy and a boat small, this plan will be generally the safest, as a boat can be kept more under command when the full force of the oars can be used against a heavy surf than by backing them only.

2. If rowing to shore with the stern to seaward, by backing the oars on the approach of a heavy sea, and rowing ahead again as soon as it has passed the bow of the boat; or as is practiced in some lifeboats, placing the after oarsmen with their faces forward, and making them row back at each sea on its approach.

3. If rowed in bow foremost, by towing astern a pig of ballast or large stone, or a drogue, the object of each being to hold the boat's stern back and prevent her being turned broadside to the sea or broaching to.

Heavy weights should be kept out of the extreme ends of a boat; but when rowing before a heavy sea, the best trim is deepest by the stern. A boat running before a heavy sea should be steered by an oar as the rudder will then at times be of no use.

The following rules may therefore be depended on when running before a heavy surf.

1. As far as possible avoid each sea by placing the boat where the sea will break ahead of her.

2. If the sea is very heavy, or if the boat is small, and especially if she has a square stern, bring her bow around to seaward and back her in, rowing

ahead against each heavy surf sufficiently to allow it to pass the boat.

3. If it be considered safe to proceed to the shore bow foremost, back the oars against each sea on its approach, so as to stop the boat's way through the water as much as possible, and if there is a drogue or other instrument in the boat which may be used as one, tow it astern.

4. Bring the principal weights in the boat toward the end that is seaward, but not to the extreme end.

5. If a boat worked by both sails and oars be running under sail for the land through a heavy sea, her crew should, under all circumstances, unless the beach be quite steep, take down her masts and sails before entering the broken water, and take her to land under oars alone. If she have sails alone, her sails should be much reduced, a half-lowered foresail or other small headsail being sufficient.

III. Beaching or Landing Through a Surf.

The running before a surf or broken sea, and the beaching of a boat, are two distinct operations; the management of boats, as above recommended, has exclusive reference to running before a surf where the shore is so flat that the broken water extends to some distance from the beach. Thus, on a very steep beach, the first heavy fall of broken water wll be on the beach itself, while on some very flat shores there will be broken water as far as the eye can reach. The outermost line of broken water, on a flat shore, where the waves break in three or four fathoms of water, is the heaviest, and therefore the most dangerous, and when it has been passed through in safety, the danger lessens as the water shoals, until, on nearing the land, its force is spent and its power is harmless. As the character of the sea is quite different on steep and flat shores, so is the customary management of boats on landing different in the two situations. On the flat shore, whether a boat be run or backed in, she is kept straight before or end to the sea until she is fairly aground, when the surf takes her further in as it overtakes her, aided by the crew, who will then generally jump out to lighten her, and drag her in by her sides. As above stated, sail will, in this case, have been previously taken in, if set, and the boat will have been rowed or backed in by oars alone.

On the other hand, on the steep beach, it is the general practice, in a boat of any size, to retain speed right on to the beach, and in the act of landing, whether under oars or sail, to turn the boat's bow half-around toward the direction from which the surf is running, so that she may be thrown on her broadside up the beach, when abundance of help is usually at hand to haul her as quickly as possible out of the reach of the sea. In such situations, we believe, it is nowhere the practice to back a boat in stern foremost under oars, but to row in under full speed as above described.

MANAGEMENT OF A YACHT IN A ROUGH SEA.—When sailing a small yacht in a rough sea certain precautions must be observed which we will describe as briefly as possible, for to handle a vessel properly under these circumstances requires a skill that cannot be imparted by books.

In the first place, do not carry on too much; for it will often be necessary to bear away or luff according to the seas, regardless of the wind; and if too much sail be carried this cannot be done.

A beam sea is the most dangerous. If you are obliged to sail in a direction that brings the sea abeam, keep a sharp look-out and luff up to every sea that looks dangerously steep, so as to take it at a sharp angle instead of broadside on.

To run before a high sea is also dangerous, especially if the vessel is a short and beamy one, for a sea may strike the stern on one side and cause her to broach to; or again the vessel may be pooped, that is, a sea may break on board over the stern, filling the well and even swamping her.

While running before the sea, steer with great care, so that every dangerous sea strikes the vessel right aft, and not on the side, and be ready to meet promptly with the tiller any tendency to broach to.

If you are sailing with the sea on the quarter, bear away to every dangerous sea so as to bring it right aft.

To sail against the sea, as when one is close-hauled, is the safest way of meeting it. A sea breaking over the bows can do little harm in comparison to one coming over the stern. Luff up so as to meet a dangerous sea nearly end on, and bear away after it has passed, but take care that the way of the vessel is not lost in doing this.

We have already explained how to heave to, the most prudent measure that can be taken in bad weather, provided one has plenty of sea room to leeward.

It may happen that when one is sailing along the coast for some harbor of refuge the wind is dead on shore so that the seas are on one's beam. If the seas are so dangerous that it becomes very hazardous to proceed in this way, it is best to sail in a zigzag fashion toward one's port—that is, first to sail almost close hauled out to sea, then, having watched one's opportunity in a smooth, to bear away again and run right before wind and sea toward the shore, and so on till the harbor is reached.

The sea and wind are fortunately generally in the same direction; but what is called a cross sea sometimes rolls up at intervals, especially if the direction of the wind has recently changed. These cross seas must be carefully watched and steered for.

Always wait for a smooth before tacking in rough water. In open water there is a regular rhythm in the movement of the seas, and it will be observed that at regular intervals three exceptionally heavy seas will follow each other in succession. These heavy waves are invariably followed by a short period of comparatively smooth water; and a sharp steersman will always wait for this smooth before putting his vessel about in rough weather.

Boarding.—It will sometimes be necessary to go off in the dinghy to one's yacht when she is sailing or hove to in a rough sea, or one may have to bring one's boat alongside some large vessel in order to board her.

In doing this certain precautions must be observed. In the first place, a vessel should be boarded to leeward, as the sea will not be so violent on the lee as on the windward side.

In boarding a vessel that is rolling a good deal, lower your boat's mast, if she has one, before getting alongside.

The line by which you make fast to the vessel must be long enough to allow for the rising and falling of the sea. Have this line ready to slip in a moment.

If the vessel is hove to, do not get alongside while she has sternway; wait till she has headway.

Sometimes, as in the case of boarding a stranded vessel, it is dangerous to get under her leeside, as the masts may fall on one, or the boat may get entangled among drifting rigging. It is the practice of lifeboats, under such circumstances, to anchor to windward of the wreck and veer cable until one can throw a line on board.

CHAPTER IX.

FITTING OUT.

Ballasting a yacht—Lead on keel—The anchor—Setting up rigging—Ventilation and dry-rot—Mildew in sails—Stretching new sails—Laying up a boat for the winter—Inventory.

Ballast.—In ballasting a yacht, whatever material be used, certain general rules must be observed.

In the first place no ballast should be stowed at either extremity of a vessel; it should, as far as is possible, be concentrated in the midship section. This cannot be done unless a heavy, and therefore compact form of ballast such as lead or iron is employed. If ballast be divided throughout the entire length of a vessel she will be sluggish in a sea-way; her head will not rise to the waves, but plunge into them, and it will be the same with her stern; she will be a wet and uncomfortable craft. On the other hand, a vessel whose ballast is concentrated amidships will be lively, her bow and stern in succession will rise buoyantly to the seas, and she will be a dry, seaworthy craft.

It is always well to have some of the ballast for a small yacht outside, on her keel; for it will be generally found impossible to stow all the ballast in the midship section without raising the floor and so sacrificing-head room in the cabin.

In placing ballast on the outside of a vessel, the same precaution must be taken as when stowing it inside—no weight must be put at the ends of the vessel. The lead or iron keel should not be carried down her whole length, as it often is, but should be mortised into the central portion of the wooden keel.

In the next place, ballast should be stowed as low as possible; for the lower it is the less amount of it suffices to give the vessel the necessary stability. Here again the advantage of a metal keel is apparent. The leverage of the outside ballast is so enormous that the yacht becomes practically uncapsizable. But an excessive weight of lead on the keel will strain a vessel in rough water; she will recover herself with a quick jerk after heeling over to a puff, and her every motion will be violent. The most comfortable vessel at sea is undoubtedly the one that carries only a moderate weight of ballast on her keel, and the bulk of it inside.

Should a vessel be coppered, care must be taken that the sheathing does not touch—or even approach within an inch or two—the iron keel; for the galvanic action set up between the two metals would rapidly corrode the iron.

In order that the ballast may fit closely and so lie as low as possible in a vessel's hold, it is well to have it cast in molds shaped like the interior of the vessel's bottom. This is more important in the case of the limber ballast—that is, the lowest layer of ballast which rests on the vessel's timbers. This can be so molded as to project downward between the limbers and fill up what would otherwise be empty space; for ballast must on no account be supported by the planking, but always by the timbers or framework of the vessel. If you put pressure from the inside on your yacht's planking, do not be surprised if she soon becomes nail-sick and leaky.

If ordinary pig and not molded ballast be used, the spaces between the bottom timbers are empty. It is an excellent plan to fill them up fore and aft with Portland cement. This, hardening to the shape of the vessel, becomes as it were a part of her, and, far from exerting outward pressure on the planking, strengthens the bottom considerably. It not only serves as ballast, but effectually prevents the water leaking through that portion of the vessel covered by it.

Lead is far the best ballast that can be used, the only objection to it being its great cost. However, it may be set off against this that lead does not corrode to any extent, and if the yacht is broken up or sold, the lead ballast can be sold at its market value with as much ease as if it were a precious metal.

The specific gravity of lead is to that of iron, roughly, as eleven to seven. Not oxidizing readily, it makes much cleaner ballast than iron, and it does not produce appreciable galvanic action and corrosion when in contact with another metal. Iron ballast, unless it is painted, fills the bilge water with rust, which will stain everything it comes across when pumped on deck. Even if the pump leads, as it should do, over the side, the water thrown out will leave an ugly stain on the paint.

If pig iron is used as ballast. the interstices between the pigs can be fitted up with small fragments of scrap iron, which can be purchased very cheaply.

If the spaces between the timbers are not filled with Portland cement, by which the bilge is kept quite sweet, the limbers or holes through the bottom timbers must be kept clear, so that the bilge water cannot accumulate anywhere and become offensive, but will run down freely to the pump-well.

With this object, a small chain is generally kept rove through the limber holes. By drawing it backward and forward the limbers are cleared of shavings or other obstacles that are blocking them up.

We may here remark that it is important to arrange the pump-well so that it can be got at in a moment; if the pump is choked it can thus be quickly cleared.

To keep the inside of a vessel sweet tar the bottom timbers and plankings before putting the ballast in; this of course also serves to preserve the wood.

THE ANCHOR.—A good anchor should combine various qualities, the chief of which, so far as a yacht's anchors are concerned, are, holding power, exemption from fouling, and easy stowage.

SETTING UP RIGGING.—The forestays, main shrouds, and other portions of a yacht's standing rigging are now very seldom made of hemp, but of galvanized wire. These must always be set up taut as soon as they show signs of slackness, but not quite so taut as hempen stays are set up, for wire does not stretch like hemp. Wire shrouds set up too taut put an enormous strain on the sides of a boat, and will in course of time pull them quite out of shape. The mast should not be so rigidly stayed down that it has no play; on the contrary, when sail is set, a mast should be allowed to bend and so take upon itself a considerable proportion of the strain before any is thrown upon the weather shrouds.

The shroud lanyards are of rope, but are not long enough to give sufficient play by stretching; however, they do give some life and spring to the rigging, whereas the iron screws with which the shrouds on some small yachts are set up cannot give and take in the least, must strain the boat, and seem to us wholly objectionable, though they do save some labor to an indolent mariner.

To set up a shroud, get it taut with a watch tackle (see Fig. 12)—the smallest yacht ought to carry at least one watch tackle, or "handy billy," as sailors call it; it is useful for a variety of odd jobs—then reeve the lanyards through the dead-eyes and make the ends fast.

When a yacht is under way in a fresh breeze the weather shrouds are very taut and the lee shrouds slack. So the lee shrouds can easily be set up by hand, and when the vessel has gone about on the other tack the other shrouds will become the slack ones and can be set up in the same manner.

VENTILATION AND DRY-ROT.—One cause of dry-rot is the use of unseasoned timber in the construction of a vessel, but this fatal evil has its origin most frequently in want of ventilation.

The air should permeate freely every portion of a vessel's woodwork. The ballast should be so stowed that it does not interfere with the ventilation of the hold; and holes, which can form an ornamental pattern, must be drilled at intervals along the paneling of the cabin.

MILDEW IN SAILS is always the result of carelessness. It is not wet that causes mildew, but dampness combined with want of ventilation. Thus, if a sail be furled when it is damp, the inner folds will mildew. A wet sail should always be furled loosely, and it should be shaken out and dried at the earliest opportunity. If it has been lying furled in a damp state for some time do not wait for the sun, but shake it out and give it air, even if the rain be falling.

Do not, because you have furled your sail dry and put its waterproof cover on it, imagine that you can leave it thus with safety for an indefinite time. The damp will get into it in some way, and half the mildew in sails is due to a blind faith in sail-covers.

Remember that the light cotton of which the topsails and spinnakers of small yachts are made is much more liable to mildew than flax canvas.

STRETCHING NEW SAILS.—If a new sail is not treated with proper care when it first comes from the makers, it will stretch irregularly, forming a great bag in one place, and having tight wrinkles in another. If a sail be thus spoiled at the outset the fault can never be remedied, and it will remain a badly standing sail to the end.

Do not put too great a strain on any part of a new sail. For instance, while bending the mainsail do not haul out its peak and clews along the gaff and boom with powerful tackle. Have them out taut, of course, but do not try TO and stretch them out at first by main force so as to save yourself future trouble. Let the whole sail stretch equally.

It is a good plan, and the delay will be well repaid, not to get under way at once with one's new sails, but to remain at anchor for a few days, and haul the sails up for some hours each day. They will then, with their own weight and the slight action of the wind swinging them about without filling them, stretch in a gradual and uniform way.

After this you will find your mainsail slack along the gaff, and you can tighten up your peak lashing and lacing.

The first day that you get under way with your new canvas should be a fine one. If it comes on to blow hard, and you have to reef your mainsail, it will certainly be pulled out of shape. You must not expect your sails to stretch in a day. You will have to tighten up the lacing and haul out the earing many times before your mainsail has stretched its full, and the oftener the better for your sail's flatness.

Laying up a Boat for the Winter.—In laying up a small yacht it is well to have her upon shore, and, if possible, under cover. She will thus become thoroughly dry, and she will be far more buoyant when she is launched again than if she had been lying on the mud all winter with the water soaking through her.

All the ballast should be taken out of a boat when she is laid up. If the limber pieces be molded to fit the shape of the bottom, each piece should be numbered so that its particular place in the hold will be known when fitting out again.

The bottom of the boat inside should be thoroughly cleansed and then tarred.

If any weeds are growing on the outside scrape them off as soon as the yacht is on shore. It is much easier to do so when they are moist than after they have dried on the wood.

When taking the running rigging off a small yacht the simplest plan is not to unreeve the halyards, but to unhook the blocks and carry them away with the halyards. Write the name of each halyard on one of its blocks, or, better still, mark both blocks of a halyard, showing which is the upper and which the under.

You will thus greatly simplify the task of rigging the vessel again on the following season; for to recognize one's rigging when ropes and blocks are lying in front of one unmarked is no easy matter.

If the yacht is to be left out of doors for the winter, cover the decks with common varnish and the spars with grease and white lead. Resin dissolved in boiled oil makes a very good varnish for coating woodwork that is to be exposed to the open air during the winter.

Remember that there is nothing that will so spoil and blacken a vessel's decks as an accumulation of snow upon them. It is a wise precaution to build a rough sloping roof over the decks, of hurdles and old canvas, or anything that comes handy, when laying her up. If she is laid up in a river where she may be exposed to floating ice, fasten hurdles around her sides.

Skylights and hatches must be frequently opened during the winter, so as to ventilate the vessel, and any water must be pumped out of her. A yacht will deteriorate more through one winter's neglect than in ten years' fair sailing.

The sails should of course be thoroughly dried before being stowed away for the winter. They should be stowed in a dry, well-ventilated loft. If they are soaked in sea water before being dried they are not so liable to mildew.

Inventory.—There are many small but necessary articles which the amateur is likely to forget when starting for a cruise in his new boat. We will enumerate some of the most important of these. Marline spikes, a sail-maker's needle and palm, plenty of spun-yarn and seaming twine. Spare ropes, including stuff for lanyards, etc. Spare blocks, thimbles, cliphooks, shackles, etc. The most necessary carpenters' tools, including the nails and screws likely to be required. Universal spanners, for screwing on or unscrewing nuts of various sizes. Paints in tins, with turpentine, oil, dryers, and brushes. Scrapers for removing old paint, etc. Stout fenders, to be used while getting alongside a wharf, and on other occasions, when outside paint is in danger. A good warp—grass rope or coir will answer the purpose well. A watch tackle or "handy billy," which is, as we have shown, useful for a variety of purposes. A snatch-block with a tail, very handy when a pull is required on any rope, as it can be clapped on in a moment. A small screw-jack. A serving mallet.

CHAPTER X.

THE ECONOMY BETWEEN DECKS.

The well—Arrangement of cabin—Leaky decks—Cabin lights—The forecastle—Cooking stoves.

The available space in a small yacht is generally partitioned off into an open well, a cabin, and a forecastle.

The steering is done from the well, and all the sheets are belayed to cleats within easy reach of it. The well is surrounded with seats and lockers. The after locker is sometimes used as a sail room; but in a very small yacht the forecastle answers better for this purpose, and the warps, etc., can be stowed in the after locker.

One of the side lockers of the well can be fitted with shelves, and will then serve as a larder. Pierce holes for ventilation into the front of it at some height above the floor.

Holes should be cut through the floor of the well, so that any water that comes on board may escape into the bilge. A wooden grating on the floor will keep one's feet dry.

The cabin generally communicates with the well by folding doors, while a small hatch is made to slide back in the cabin roof, thus making the aperture larger, and facilitating ingress and egress.

Personally we do not like cabin doors in a small yacht; they are always in the way while open, and as they cannot be—or at any rate never are—made water-tight, if a little water is shipped in the well it will find its way through the closed doors and make the cabin uncomfortable.

A better plan is to have a water-tight bulkhead dividing the cabin from the well, and at the top of the bulkhead to have a square opening which can be closed when necessary with a vertical shutter or slide. When this is open, and the hatch on the cabin roof is pushed back, it is easy to step over into the cabin. Fig. 44 illustrates this arrangement.

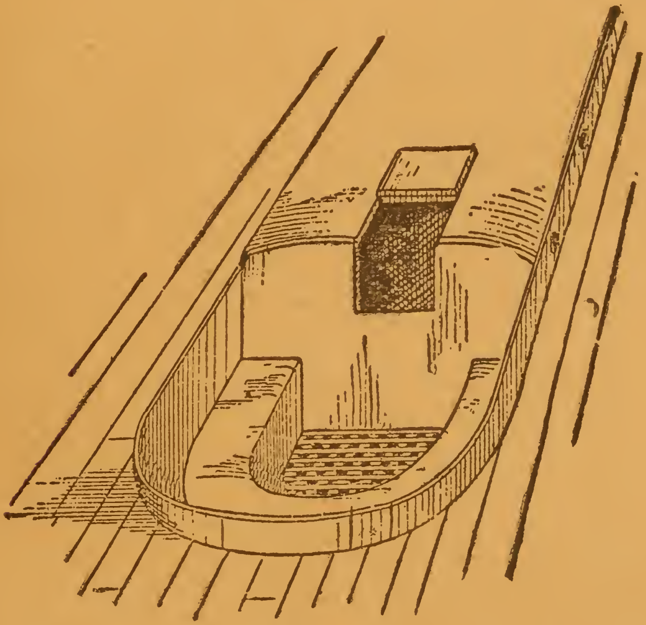

Fig. 44.

It adds considerably to the safety of a small vessel if her well be made completely water-tight. In this case there must be an additional pump in the well, to throw out any water that gets into it.

It is very convenient to have an awning that will fit over the well when the vessel is at anchor. An additional room is thus obtained which will be found very useful to perform one's toilette in.

The raised roof over the cabin is generally covered with canvas and painted white. This effectually prevents leakage.

It is not easy to keep a small yacht's decks quite water-tight, and every one who has been to sea in a little craft has passed through the unpleasant sensation of having the water falling drop by drop upon his face, as he lies in his bunk at night, from the seams in the planking between the raised cabin roof and the waterways.

In dry weather water should be freely poured on the decks morning and evening, to prevent them shrinking.

A black marine putty is now made which in our experience serves as well as pitch, and as it does not require heating is much more convenient to use. Wherever a leak is discovered in the deck seams while on a voyage, stop with cotton (using a blunt knife, not a caulking-iron) and fill up the seam with this putty.

The cabin of a small yacht generally has a bunk on either side, serving as sofas by day and beds by night, with lockers under them, useful for the stowage of such stores as will not be spoiled by water. Two or more cupboards are in the corners, and a table—one that can be folded up when not in use is best—stands in the center of the floor.

Water is sure to find its way into the cabin sometimes, so every article of furniture must be chosen with a view to its getting wet. A carpet is not suitable for the floor of a small yacht; it is unpleasant when wet, and is difficult to dry. Oilcloth or linoleum is better, but these are cold to the feet. The best material with which to cover the floor is cocoanut matting of a good quality. It is made in every width, so a piece of the breadth of the cabin floor can be procured. Cocoanut matting looks well, is pleasant and warm to walk upon with bare feet, can be washed easily, and dries very quickly.

Horsehair is, of course, the best material with which to stuff the cushions of the bunks. These are often covered with American cloth, which dries quickly, but is cold and disagreeable, especially if one's blanket slips off at night and one's naked foot comes in contact with it. Cretonnes and other cotton stuffs are cold when damp, and are altogether unsuitable for the purpose. After having tried many materials, the author prefers dark blue flannel to any other for cushion covers. The flannel feels warm even when it is wet, and one will not catch cold while sleeping on it.

The paneling of the cabin should be, if possible, of some hard wood, polished. This is much more ornamental than painted wood, and though more costly at the outset, is more economical in the long-run, for in order to keep up a smart appearance paint must often be renewed.

If the cabin be painted, white paneling with a plain gilt molding around the top looks very well; but white paint gets dirty quickly, and a fresh coat is required very frequently. Possibly the white enamel paints now largely manufactured would answer the purpose better, as they form a very hard coat which can be thoroughly washed without injury.

For cabin lights, spring candlestick lamps, swinging on gimbals, are the best; these can be obtained at any yachting warehouse; they are provided with globes, and with some shades to be screwed into the ceiling above to prevent its discoloration. They can be lit in a moment, and are much cleaner to handle than other lamps. But while on a cruise it will be often necessary to have a light burning all night in the cabin, so as to be able to refer to the chart, etc. A paraffin lamp swung over the table will then be more convenient and economical.

The interior of a small yacht's cabin can be made to look very pretty and snug. The library shelf can be on the forward wall, with the aneroid on one side of it and the clock on the other. On the side walls above the bunks the charts, guns, and fishing-rods can be slung. A rack for glasses and another for pipes can be fitted where most convenient.

As the blankets that serve for the yachtsman's bedding cannot well be stowed out of sight in a small cabin, it is well to have them as ornamental as possible. Red blankets neatly folded up at one end of the blue flannel bunk cushions give a bright appearance to the cabin. The windows and the skylight should have little blinds—red silk looks very well.

The forecastle of a yacht of the size we are speaking of is rarely large enough to afford sleeping accommodation, unless it be to a small boy. The chain-locker is here, and here too are stowed the spare sails, the mops, brooms, buckets, etc. The cooking-stove should also be in the forecastle. This, in our opinion, should invariably be a spirit stove, on a small craft where little cooking is done. A paraffin stove has an unpleasant smell, even if the wick be kept carefully trimmed, and it is the cause of a great deal of dirt.

Excellent galvanized cooking-stoves for burning methylated spirits are now manufactured. These produce no dirt. It may be of use to mention here that spirits of wine for burning purposes can be procured at a cost very far under that of methylated spirits.

Mildew generates very quickly in the interior of a yacht; therefore it is very necessary that all clothing and bedding be brought on deck to dry at every convenient opportunity. Any shackles or other small iron work not in use should—if ungalvanized—be greased before being put away in the lockers.

There are so many odd corners in a yacht in which dirt can accumulate and conceal itself that a srupulous cleanliness is necessary. Scrub and swab everything like a Dutch woman, and take care that no morsels of meat or other perishable matter be swept through the chinks of the floor into the bilge. Even paper and straw will produce a very unpleasant odor after they have been lying sodden some while. Therefore take the paper covers off your tins of meat before stowing them under the bunks.

CHAPTER XI.

THE LAWS OF THE SEA.

Board of trade regulations concerning lights, fog signals, steering and sailing rules, pilot signals, etc.—Custom House clearance on returning from a foreign port—Explanation of the terms used in giving steering directions, etc.

Any one who ventures to take charge of even a small yacht should be familiar with the Board of Trade regulations for preventing collisions at sea, and not only with those rules which have been laid down for his own guidance, but with those applying specially to steamers, to fishing-boats, or other craft differing from his own, that he may recognize their maneuvers when he comes across them, and thus be able to avoid collision with them.

We will now quote the Board of Trade regulations, making such comments and explanations as we think will be useful.

Art. I.—In the following rules every steamship which is under sail, and not under steam, is to be considered a sailing ship; and every steamship which is under steam, whether under sail or not, is to be considered a ship under steam.

The following are the Rules Concerning Lights:

Art. 2.—The lights mentioned in the following Articles numbered 3, 4, 5, 6, 7, 8, 9, 10, and 11, and no others, shall be carried in all weather, from sunset to sunrise.

Art. 3.—A sea-going steamship, when under way, shall carry:

(*a*) On or in front of the foremast, at a height above the hull of not less than 20 feet, and if the breadth of the ship exceeds 20 feet, then at a height above the hull not less than such breadth, a bright white light, so constructed as to show a uniform and unbroken light over an arc of the horizon of 20 points of the compass; so fixed as to throw the light 10 points on each side of the ship, viz., from right ahead to two points abaft the beam on either side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least five miles.

(*b*) On the starboard side, a green light so constructed as to show a uniform and unbroken light over an arc of the horizon of 10 points of the compass; so fixed as to throw the light right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

(*c*) On the port side, a red light, so constructed as to show a uniform and unbroken light over an arc of the horizon of 10 points of the compass; so fixed as to throw the light from right ahead to two points abaft the beam on the port side; and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

(*d*) The said green and red side lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

ART. 4.—A steamship, when towing another ship, shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than three feet apart, so as to distinguish her from other steamships. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light which other steamships are required to carry.

ART. 5.—

(*a*) A ship, whether a steamship or a sailing ship, which from any accident is not under command, shall at night carry, in the same position as the white light which steamships are required to carry, and, if a steamship, in place of that light, three red lights in globular lanterns, each not less than 10 inches in diameter, in a vertical line one over the other, not less than three feet apart, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles; and shall by day carry, in a vertical line one over the other, not less than three feet apart, in front of but not lower than her foremast head, three black balls or shapes, each two feet in diameter.

(*b*) A ship, whether a steam or a sailing ship, employed in laying or in picking up a telegraph cable, shall at night carry in the same position as the white light which steamships are required to carry, and, if a steamship, in place of that light, three lights in globular lanterns, each not less than 10 inches in diameter, in a vertical line over one another, not less than six feet apart: the highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character that the red lights shall be visible at the same distance as the white light. By day she shall carry in a vertical line, one over the other, not less than six feet apart, in front of but not lower than her foremast head, three shapes not less than two feet in diameter, of which the top and bottom shall be globular in shape and red in color, and the middle one diamond in shape and white.

(*c*) The ships referred to in this Article, when not making any way through the water, shall not carry the side lights, but when making way shall carry them.

(*d*) The lights and shapes required to be shown by this Article are to be taken by other ships as signals that the ship showing them is not under command, and therefore cannot get out of the way. The signals to be made by ships in distress and requiring assistance are contained in Article 27.

ART. 6.—A sailing ship under way, or being towed, shall carry the same lights as are provided by Article 3,, for a steamship under way, with the exception of the white light, which she shall never carry.

ART. 7.—Whenever, as in the case of small vessels during bad weather, the green and red side lights cannot be fixed, these lights shall be kept on deck, on their respective sides of the vessel, ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side.

To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

ART. 8.—A ship, whether a steamship or a sailing ship, when at anchor, shall carry, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light in a globular lantern, of not less than 8 inches in diameter, and so constructed as to show a clear uniform and unbroken light visible all round the horizon, at a distance of at least one mile.

ART. 9.—A pilot vessel, when engaged on her station on pilotage duty, shall not carry the lights required for other vessels, but shall carry a white light at the masthead, visible all round the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals which shall never exceed fifteen minutes.

A pilot vessel, when not engaged on her station on pilotage duty, shall carry lights similar to those of other ships.

ART. 10.—Open boats and fishing vessels of less than 20 tons net registered tonnage, when under way and when not having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side lights; but every such boat and vessel shall in lieu thereof have ready at hand a lantern with a green glass of the one side and a red glass on the other side, and on approaching to or being approached by another vessel, such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

A very convenient lantern is now sold by the yachting outfitters, which not only combines in itself the port and starboard lights, as permitted by Article 10; but on the removal of a slide serves as a riding-light as well.

Small yachts are generally provided with lanterns of smaller size and less illuminating power than those enjoined in the regulations; but it is best to comply with these rules if possible, so that one can have the right on one's side in case of a collision. It often happens again that small lights burn in an unsatisfactory manner, and frequently go out. A riding-light that does this is a great nuisance, and spoils one's night's rest when one is brought up in a crowded thoroughfare.

We prefer lanterns that burn paraffin for sea work; if colza is used some camphor should be dissolved in it; this increases the illuminating power, and in our opinion the light is not so likely to go out when this is done.

The following rules relate to Fog Signals. It will be observed that the old-fashioned fog horn which is sounded with the mouth is not recognized by the present regulations. It is, however, still generally used on small craft, and will certainly make more noise than some of the mechanical fog horns:

Art. 11.—A steamship shall be provided with a steam whistle, or other steam sound signal, so placed that the sound may not be intercepted by any obstructions, and with an efficient fog horn to be sounded by a bellows or other mechanical means, and also with an efficient bell. A sailing ship shall be provided with a similar fog horn and bell.

In fog, mist, or falling snow, whether by day or night, the signals described in this Article shall be used as follows; that is to say:

(*a*) A steamship under way shall make with her steam whistle, or other steam sound signal, at intervals of not more than two minutes, a prolonged blast.

(*b*) A sailing ship under way shall make with her fog horn, at intervals of not more than two minutes, when on the starboard tack one blast, when on the port tack two blasts in succession, and when the wind abaft the beam three blasts in succession.

(*c*) A steamship and a sailing ship, when not under way, shall, at intervals of not more than two minutes, ring the bell.

Art. 12.—Every ship, whether a sailing ship or steamship, shall in fog, mist, or falling snow, go at a moderate speed.

Next come the articles relating to the Rules of Steering and Sailing.

In applying these the novice must never forget that when he stands on his deck and looks forward, the port side of his vessel is on his left, the starboard side on his right. When a vessel is on the port tack the wind is blowing from the port or left side of him; when she is on the starboard tack from the starboard or right side.

Let him also remember that though he should observe these rules as closely as possible, Article 23 affords a fine loophole for the huge and clumsy steamers that crowd the Thames and other rivers. It is a well-known fact that big steamers will not get out of the way of small sailing craft, even when they can do so without difficulty, and the little boat is expected to get out of their way.

The moral of this is: Keep out of the way of the big steamers, not by getting flurried and altering your course at the last moment, against all the rules of the road, and so putting yourself in the wrong if there is a collision, but by altering your course and showing them your intentions some time before they are near you.

ART. 13.—When two sailing ships are approaching one another, so as to involve risk of collision, one of them hall keep out of the way of the other, as follows, viz.:

(*a*) A ship which is running free shall keep out of the way of a ship which is close hauled.

(*b*) A ship which is close hauled on the port tack shall keep out of the way of a ship which is close hauled on the starboard tack.

(*e*) When both are running free with the wind on different sides, the ship has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free with the wind on the same side, she ship which is to windward shall keep out of the way of the ship which is to leeward.

(*e*) A ship which has the wind aft shall keep out of the way of the other ship.

ART. 14.—If two ships under steam are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other.

This Article only applies to cases where ships are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two ships which must, if both keep on their respective courses, pass clear of each other.

The only cases to which it does apply are, when each of the two ships is end on, or nearly end on, to the other; in other words, to cases in which, by day, each ship sees the masts of the other in a line, or nearly in a line, with her own; and by night, to cases in which each ship is in such a position as to see both the side lights of the other.

It does not apply, by day, to cases in which a ship sees another ahead crossing her own course; or by night, to cases where the red light of one ship is opposed to the red light of the other, or where the green light o one ship is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

ART. 15.—If two ships under steam are crossing, so as to involve rish of collision, the ship which has the other on her own starboard side shall keep out of the way of the other.

ART. 16.—If two ships, one of which is a sailing ship and the other a steamship, are proceeding in such directions as to involve risk of collision, the steamship shall keep out of the way of the sailing ship.

ART. 17.—Every steamship, when approaching another ship, so as to involve risk of collision, shall slacken her speed, or stop and reverse, if necessary.

ART. 18.—In taking any course authorized or required by these regulations, a steamship under way may indicate that course to any other ship which is in sight by the following signals on her steam whistle, viz.:

One short blast to mean "I am directing my course to starboard."

Two short blasts to mean "I am directing my course to port."

Three short blasts to mean "I am going full speed astern."

The use of these signals is optional; but if they are used, the course of the ship must be in accordance with the signal made.

ART. 19.—Notwithstanding anything contained in any preceding Article, every ship, whether a sailing ship or a steamship, overtaking any other, shall keep out of the way of the overtaken ship.

ART. 20.—In narrow channels every steamship shall, when it is safe and practicable, keep to that side of the fair way or mid-channel which lies on the starboard side of such ship.

ART. 21.—Where, by the above rules, one of two ships is to keep out of the way, the other shall keep her course.

ART. 22.—In obeying and construing these rules, due regard shall be had to all dangers of navigation; and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

Art. 23.—Nothing in these rules shall exonerate any ship, or the owner or master, or crew thereof, from the consequence of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by ordinary practice of seamen, or by the special circumstances of the case.

A. 24.—Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbor, river, or inland navigation.

Art. 25.—Nothing in these rules shall interfere with the operation of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war, or for ships sailing under convoy.

The next article relates to Signals of Distress:

Art. 26.—When a ship is in distress and requires assistance from other ships, or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, that is to say:

In the daytime:

1. A gun fired at intervals of about a minute.
2. The international Code signals of distress indicated by N.C.
3. The distant signal, consisting of a square flag, having either above or below it a ball, or anything resembling a ball.

At night:

1. A gun fired at intervals of about a minute.
2. Flames on the ship (as from a burning tar barrel, oil barrel, etc.).
3. Rockets or shells, throwing stars of any color, or description, fired one at a time at short intervals.

The flags of the International Code of signals should be carried on every cruising yacht, they will often be found of service. For a small yacht, flags two feet by one and a half will suffice.

The yachtsman will occasionally require the services of a pilot or local fisherman to show him the way into some difficult harbor, and it is probable that he will be considerably confused by the steering directions given to him by his guide, and put the helm to port when he should have put it to starboard, or *vice versa*. And this is not to be wondered at; for even professionals are often puzzled by the somewhat uncertain signification of the terms now in use.

First as to the orders most frequently given at sea—"Port!" and "Starboard!" Surely there can be no vagueness about their meaning; but every sailor will tell you that there is a vagueness, and one that is no doubt responsible for many accidents.

When an American pilot cries out "Port!" or what comes to the same thing, holds his hand out to port, he does not wish the vessel's head to be turned to port, but that the helm or tiller be put to port, this action of course turning the vessel's head in a starboard direction.

Wheels are now generally used in the place of tillers on all craft of any size. Now a wheel works in a contrary direction to a tiller; that is, a wheel turning to port turns the vessel's head to port. In this case, when an American pilot cries out "Port!" he means that the wheel, rudder and head of the vessel are all to be turned to starboard.

If his rule—viz., that on every occasion on which the orders "port" or "starboard" are given, the vessel's head must be turned in the opposite direction—prevailed everywhere, all would accustom themselves to it and there would not be much confusion. But, if we visit France or some other Continental countries, we find the pilots always speak of the vessel's head and not of the helm when they give an order. In France, "Port!" does not signify "Port your helm!" but "Turn your vessel's head to port," which is the reverse of what an American pilot would mean when giving the same order.

There are other methods of giving orders to the man at the tiller which must be thoroughly understood by every amateur. The author has seen a somewhat experienced yachtsman puzzled when a boatman, who had come on board to pilot us, cried out: "Bear up!" at the same time holding his hand to windward.

Had he cried out "Bear away!" the yachtsman would have understood that the order applied to the head of the vessel—that the vessel was to be steered away from the wind. But "Bear up!" and the hand pointing to windward confused him, and he steered to windward or luffed.

Now these two orders mean exactly the same; but whereas "Bear away!" applies to the vessel's head, "Bear up!" applies to the vessels' helm or tiller which must be pushed up to windward. So, too, the pilot's hand, pointing to windward, signiefid: "Put the helm in that direction," and not "Turn the vessel in that direction."

In the table below the orders in general use are defined:

1. "Port" signifies "Turn the helm or tiller to port."
2. "Starboard" signifies "Turn the helm or tiller to starboard."
3. "Luff" signifies "Turn vessel's head to windward."
4. "Bear away" signifies "Turn the vessel's head away from the wind."
5. "Bear up" signifies "Turn the helm or tiller to windward."
6. "Put the helm down" signifies "Turn the helm or tiller away from the wind."
7. "Put the helm up" signifies "Turn the helm or tiller to windward."

It will be seen that 4, 5, and 7 are various methods of giving the same order, while 3 and 6 are the same.

The following regulations relate to PILOT SIGNALS:

In the Daytime.—The following signals, numbered 1 and 2, when used or displayed together or separately, shall be deemed to be signals for a pilot in the daytime:

1. To be hoisted at the fore, the jack or other national color usually worn by merchant ships, having round it a white border, one-fifth of the breadth of the flag; or

2. The international code pilotage signal, indicated by P.T.*

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* This is a square blue flag, having in its center a white square, hoisted over a flag of a similiar shape—the latter showing three vertical bars, colored red, white, and blue.

At night.—The following signals, numbered 1 and 2, when used or displayed together or separately, shall be deemed to be signals for a pilot at night:

1. The pyrotechnic light, commonly known as a blue light, every fifteen minutes, or
2. A bright white light flashed or shown at short or frequent intervals, just above the bulwarks, for about a minute at a time.

And "Any master of a vessel who uses or displays, or causes or permits any person under his authority to use or display, any of the said signals for any other purpose than that of summoning a pilot, or uses, or causes, or permits any person under his authority to use any other signal for a pilot, shall incur a penalty not exceeding one hundred dollars.

CHAPTER XII.

INSTRUMENTS OF NAVIGATION NECESSARY FOR COASTING.

Mercator's chart—The mariner's compass—The spirit compass—Variation—Deviation—The log ship and line—The lead line.

As soon as the amateur leaves the bay or river with whose features he is well acquainted and ventures to take his vessel along a coast unknown to him, he must provide himself with the necessary instruments for finding his way and make himself familiar with their use.

As the management of large yachts is not within the scope of this book, it will be unnecessary to treat here of navigation properly so called—that is, the art of guiding a vessel across broad seas, out of sight of land, by observation of the sun and stars and by dead reckoning. But we may remark that an educated man will find no difficulty in rapidly acquiring the art of navigation if he wishes to do so. It is the seamanship that will give him trouble; for to acquire that a long apprenticeship and considerable natural capacity are necessary.

For coasting purposes and for crossing narrow seas such as the Channel, and the North Sea, and even for a voyage to the Baltic, sextants, chronometers, and other instruments of navigation proper are not required, and the following is a complete list of all that is needed for the purpose of finding one's way. 1. The necessary charts. 2. A mariner's compass. 3. A parallel rule. 4. A pair of compasses or dividers. 5. A log ship and line. 6. A hand-lead and line. 7. One of the small nautical almanacs which give the tide tables for the principal harbors.

CHARTS.—Whatever method is employed for representing a portion of a globe on a plane surface, the result can only be approximately correct. Charts are drawn on what is known as Mercator's projection, which, though it greatly distorts the relative magnitudes, is the most convenient for purposes of navigation.

The parallels of latitude on the globe are everywhere equidistant. On the other hand, the meridians of longitude are furthest apart at the equator, and gradually approach till they meet at the poles.

In Mercator's chart the meridians of longitude are drawn parallel and equidistant. The distortion in the direction of longitude resulting from this projection is counterbalanced by distorting the latitude to a proportionate extent; that is, the parallels of latitude are drawn further apart as the poles are approached.

Thus, on a chart of the world, the polar regions are greatly magnified when compared to the regions near the equator; still, as the degrees of latitude and those of longitude are proportionately magnified, the general shapes of any particular tract is preserved.

The reason why this projection is the most adapted for purposes of navigation is that it produces no errors of direction; that is, if one place is northwest of another, it appears so on a Mercator's chart. It follows, from what has been said, that one scale of miles will not serve for a chart; as the scale is ever varying. The method of overcomng this difficulty while measuring the distance from one place to another on the chart will now be explained.

On inspecting an ordinary chart it will be found that the top of it is true north, the bottom true south.

Along the top and bottom are graduated parallels, which are divided into degrees and minutes, and which enable us to distinguish the longitude of any position on the chart.

So, too, on the right and left sides of the chart we find graduated meridians also divided into degrees and minutes, and which enable us to measure the latitude of any position on the chart.

Now, as a degree or a minute of latitude is the same length everywhere, we can use these graduated meridians as scales of miles. Each degree is divided into sixty minutes. A minute or nautical mlie is about one sixth longer than an English mile.

But as Mercator's chart distorts the latitudes, each portion of the graduated meridians serves as a scale of miles only to that part of a chart immediately opposite to it—that is, on the same latitude. Consequently, to measure the distance between two places on the chart; for instance, Falmouth harbor in latitude 50° and Madeira in latitude 30°, we proceed as follows. The dividers are spread out till their points are over the two places on the chart. This distance is then measured off on the graduated meridian, by so placing the dividers on the scale that the mean latitude of the two places—that is, latitude 40°, is marked on the graduated meridian exactly half way between the two points of the dividers.

The graduated parallels cannot, of course, be used as scales of miles for purposes of measurement.

While measuring distances on the large scale charts used for coasting purposes it matters little what portion of the graduated meridians be used as a scale, for the error will be imperceptible. It is only while using what are known as general charts, which extend across many degrees of latitude, that a considerable error will result from not measuring from the mean latitude.

Compasses are generally designed on various portions of a chart. These compasses usually indicate the magnetic and not the true bearings. (See COMPASS.)

Various abbreviations are used on charts which are generally explained in a corner of the chart itself. Thus the nature of the bottom is indicated by *sft* for soft, *c.* for coarse, *h.* for hard, etc., while buoys are marked R. for red, HS. for horizontally striped.

The soundings in fathoms or feet are indicated by numbers, the depth being calculated at low water ordinary spring tides. Where shoals sometimes dry, their height above low water spring tides is given by underlined numerals.

Roman numerals on a chart give the hour of high water at that spot at the full and change of the moon.

The velocity of the tide in knots is also indicated and its direction shown by arrows.

The yachtsman should provide himself with large scale Admiralty charts; for these alone can guide him into those shallow intricate channels frequented by small coasters only, which we will be so often tempted to enter.

THE MARINER'S COMPASS.—Every one is more or less familiar with the use of the mariner's compass, the instrument which enables us to know the direction in which a vessel is sailing when out of sight of land.

The compass card (Fig. 45) is divided into thirty-two points, so, as a circle contains 360°, the distance from one point to the next is 114¼°.

Sometimes a point is expressed in its angular value—that is, the number of degrees the point is west or east

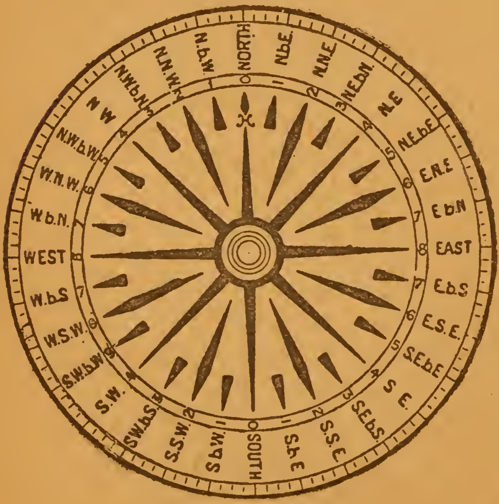

Fig. 45.

of the meridional line joining north and south. Thus N. by E. would be called N. 11¼ E., and N. E., N. 45° E.

Compass bearings are calculated to quarter points, as N. E. ¼ E., which signifies N. E. and quarter of a point toward E.

The compass card moves freely on a pivot in the compass bowl, which in its turn is balanced on gimbals, enabling it to preserve a horizontal position despite the vessel's rolling and pitching.

The binnacle or case in which the compass bowl is swung is provided with a lamp, so that the man steering can read the compass card by night.

Inside the bowl is a small mark, called the "lubber's line," which is exactly in a line with the head of the ship. That portion of the card which touches the lubber's line therefore indicates the direction in which the vessel is pointing.

The jerky motion of a small craft will often cause an ordinary compass card to oscillate and even to completely revolve, so that the direction in which one is steering cannot be ascertained. It is therefore necessary to use a heavy compass card whose movement will be more sluggish. A spirit compass in which the card is surrounded by fluid—is the best adapted for small vessels.

But when a little craft is pitching quickly the very best compass will oscillate to some extent. In this case, one must observe the extreme points on either side reached by the swinging card and take the mean between them as the ship's direction.

The needle points to the magnetic north, which coincides with the true north in certain portions of the earth only. The difference between the magnetic and real north is called the variation of the compass, it differs in different places, and is constantly but very slowly changing.

The variation at the mouth of the Thames, for instance, is now roughly 20° W.; that is, the needle is dragged 20° to the west of north, so that if a vessel's head be pointing true north, her compass will indicate a direction of about N.N.E.

The compasses designed on a chart generally show, as we have already explained, the magnetic and not the true bearings. Consequently, in order to ascertain the course that should be steered from one place to another, we lay one edge of the parallel rules on the two places on the chart, and by opening the rule we slide the other edge along—always preserving the direction—until it is on the center of one of the compass designs on the chart. The direction thus indicated represents the course to be steered by compass.

But if the compasses on the chart are, as sometimes happens, true and not magnetic, the course shown by the rule is not the one to be steered by compass. We must, in this case, discover the variation existing in the locality—generally given on the chart—and convert the true course as indicated by the. edge of the rule into a compass or magnetic course. To do this, if the variation is so many degrees west, the course to be steered will be that number of degrees east of the true course if the variation is so many degrees east, the course to be steered will be that number of degrees west of the true course.

Where there is local attraction, as in an iron ship, the compass bearings will not be correct magnetic, but the needle will be dragged on one side or the other of the magnetic meridian. This error is called the deviation of the compass.

On board a wooden yacht, if certain precautions are observed, there should be no perceptible deviation of the compass. As iron ballast is generally used on a yacht, the compass should be as high as possible above it. If the boat have a well, the binnacle can at least be on a level with the raised hatch on the deck.

Care must be taken that no elongated iron mass, especially if vertical, such as a bolt, be near the compass.

Deviation is not uniform, like variation. When the vessel's head is pointing about E. or W. the deviation is generally greatest, and it is different with every direction the vessel is turned to.

The deviation, if any, is ascertained by what is termed swinging the vessel. The correct magnetic bearing of some distant object is first obtained. The vessel is then slowly swung around—this can often be done by carrying the mooring line along one side of the deck aft, and then along the other side to the bows again—and as the vessel's head comes to each point of the compass, a compass bearing is taken of the object, and the difference between that bearing and the true magnetic one is noted.

A table can then be drawn out showing the deviation to be applied for each point of the compass toward which a vessel is steering.

When steering by compass, do not keep the eyes constantly fixed on the compass card, as this is extremely wearying, especially by night. When you have got the vessel on her course, get some object ahead—a distant vessel, a cloud, a star, if no land is in sight—in line with the mast, or one of the shrouds, and steer for that; referring only occasionally to the compass, so as to correct the direction and get a new mark to steer for when necessary.

The Log Ship and Line are employed to calculate the speed at which a vessel is traveling through the water. The log ship (Fig. 46) is a quadrant-shaped piece of wood, loaded with lead at the bottom, so that it may preserve an upright position in the water. It is attached to the log line by means of a bridle.

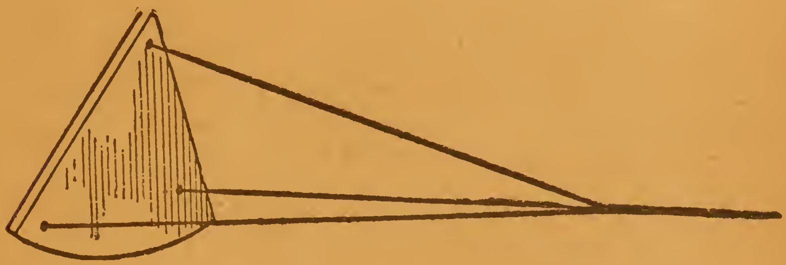

Fig. 46.

The ordinary log line is 120 fathoms long. The log glass generally used is a common sand-glass, running out in 28 seconds. The line is divided into equal distances by knots, each distance being the same fraction of a nautical mile as 28 seconds is of one hour; the distance therefore between two knots is about 47 feet.

A bit of bunting is attached to the line about 12 fathoms from the log ship. These 12 fathoms are called the stay line.

The process known as "heaving the log" is performed as follows: One hand stands by, with the glass in hand, full end downward; another hand heaves the log ship overboard, which floats away astern; the line is then steadily paid out from the reel, in such a way that no strain is put on the log ship.

At the moment when the piece of bunting marking the stray line goes overboard, the glass is smartly turned. As soon as the sand has run out, the man holding the glass calls out, "Stop!" and the log line is suddenly checked. The number of knots that have been reeled off represent the number of sea miles the vessel is sailing an hour.

Several forms of self-registering logs are now in general use. These are towed astern, and communicate the revolutions of a screw rotator to a register—either overboard or on the taffrail of the vessel—which indicates the distance run.

These patent logs do not act in an altogether satisfactory way on small sailing craft. They generally under-log the distance run when the vessel is sailing slowly, and are more adapted for use on steamers. For ordinary cruising purposes, on a small fore-and-after, we prefer the old-fashioned log ship and line, and it is not very often that one has occasion to use even that.

The Lead Line.—Two leads are employed on vessels—the deep sea lead weighing 28 pounds; and the hand lead weighing 14 pounds. The latter, or even a lead weighing somewhat less, is sufficient for a small yacht.

The line used for a hand lead is 25 fathoms long, and is generally marked as follows:

At 2	fathoms,	Leather, with two ends.
3	"	Leather, with three ends.
5	"	White calico.
7	"	Red bunting.
10	"	Leather, with hole through it.
13	"	Blue serge.
15	"	White calico.
17	"	Red bunting.
20	"	Strand, with two knots in it.

It is possible, by the different feel of the materials used, to tell what mark is in one's hand in the dark. The above depths are called marks; the intervening depths in fathoms which are unmarked are called the deeps. Thus, in five fathoms, the leadsman sings out: "By the mark five," in eleven fathoms, "By the deep eleven." He also calls out the halves and quarters of fathoms thus: "And a half six," for six and a half fathoms, "A quarter less six," for five fathoms and three-quarters.

To sound when the vessel is under way, swing the lead around and throw it as far forward as possible, so that the lead be at the bottom and the line tight from it to the hand, when the vessel is just over the lead.

If the lead be hove properly, so that it draws the line through the hands, it is easy to tell when it has reached the bottom, by the sudden withdrawal of the strain.

When sailing on very shallow waters soundings can be taken much quicker with a pole or boathook than with a lead.

There is a hollow at the heel of a lead which can be filled—armed as it is termed—with tallow; a specimen of the bottom—mud, sand, or shingle—is brought up with the lead, and this, by reference to the chart, which generally marks the nature of the bottom, may enable us to find our position.

CHAPTER XIII.

HOW TO FIND ONE'S WAY AT SEA.

Cross bearings—Tacking across the sea—Leeway—How to allow for a current—To find the hour of high water.

Having in the last chapter described the various instruments which enable a mariner to direct his course, we will now give some further explanations of the method of employing the chart and compass.

Cross Bearings.—When a vessel is in sight of land her position can be calculated with exactness by several methods.

First. By cross bearings of two known objects.

If two well-known landmarks are visible on shore, we observe how each of them bears by our compass. We then refer to the chart, lay down these bearings with the parallel rule, and the point where the lines cut will represent the vessel's position.

For instance (see Fig. 47), the beacon A is found to be N.W. of us, the beacon B N.E. of us. We lay our parallel rule on the magnetic compass design on the chart so that its edge passes through N.W. and also through the center of the compass. We then slide the rule to the beacon A on the chart—preserving the direction—and draw with a pencil the line from A indicated by the edge of the rule.

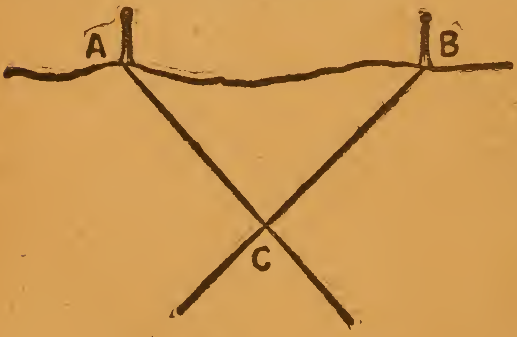

Fig. 47.

In the same way we carry the direction N.E. from the compass design to the beacon B, and draw the line from B indicated by the rule. The point C where these lines cut represents the position of the vessel, and the distance between C and the beacons or the shore can be measured with the dividers by referring to the graduated meridian on the side of the chart as a scale.

While a vessel is sailing along the shore her distance from it can be calculated as follows: We select any prominent point on the shore, as the tree A in Fig. 48. We take its bearing, which we find to be N.W. From A we draw the line A B in a N.W. magnetic direction by the compass design. Our vessel's course is N. by W. From any point B on the line A B we draw a line B C in a N. by W. direction. When we have sailed a certain distance, say five miles by the log, we take another bearing of the tree and find it is now N.E. of us. From A we draw a line corresponding to this last bearing, which cuts the line C B at C. Taking C B a distance of five miles as our scale, we can measure the distance between the vessel's position C and the tree A. A chart is not needed for the above method of calculating one's distance. A sheet of paper with a compass design sketched on it is all that is necessary.

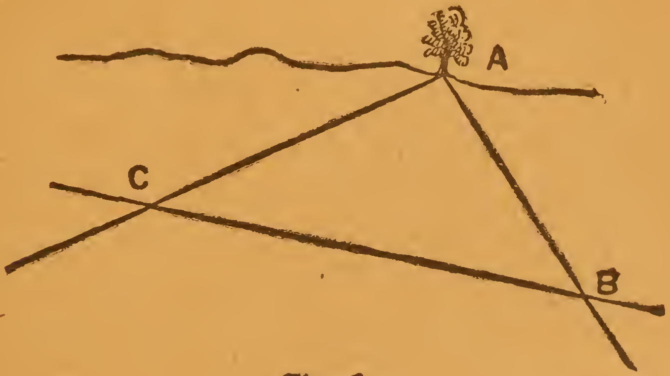

Fig. 48.

The following is a very easy method of calculating the distance of an object that one is passing, and requires no chart or diagram. Take a bearing of the object, and observe the angle this bearing makes with the vessel's course; also note the time, As the vessels sails on this angle will increase until at last it is doubled. The vessel's distance from the object will then equal the distance she has traveled since the first bearings were taken. Fig. 49 will make this method clear. A is the object on shore, C and B the position of the vessel when the bearings were taken. A C D is the angle formed by the course E D and the first bearings. When this angle is doubled, as at A B D, the line B C will equal the line A B.

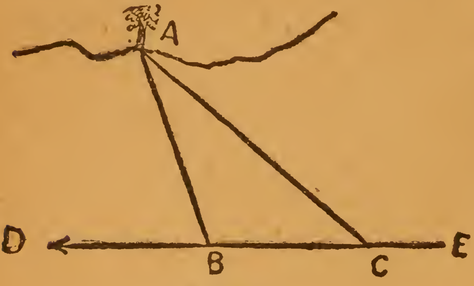

Fig. 49.

If one is sailing parallel to a coast the following is a rapid method of ascertaining one's distance from the shore. Note the time when an object on shore is exactly at right angles to the vessel's course. When one has brought the object at an angle of 45° to the vessel's course—looking aft—calculate the distance traveled since the time was noted. The distance from the shore will be the same. Thus, in Fig. 50, the vessel's direction when she is at B is at right angles to the bearings of A, the object on shore. When the vessel has arrived at C the angle A C B has a value of 45°. It follows that C D, the distance from the shore, equals C B, the distance traveled.

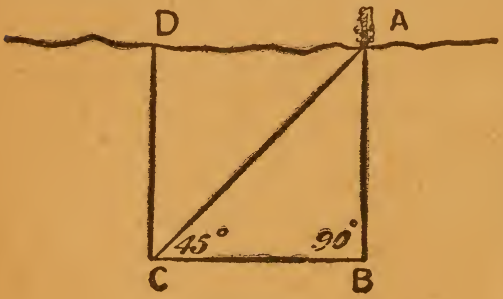

Fig. 50.

An azimuth compass is one specially adapted for taking bearings. Its card is more carefully divided than that of the steering compass, and it is fitted with sight vanes.

However, bearings sufficiently accurate for practical purposes can be taken with the ordinary compass. Hold a piece of string across the center of the compass, and, looking along it, direct it toward the object whose bearing is required, as if taking an aim with a gun. The direction of the string will then indicate the bearing on the compass card beneath.

In taking cross bearings endeavor to obtain a difference between them of as near 90° as possible; for if the difference be small, as, for example, 10°, or large, as 150°, a small error in the bearing will cause a great error in the calculation of the vessel's position.

If, when directing one's course out of sight of land, head winds are met with, and it becomes necessary to tack, it is an advantage as a general rule to sail on that tack on which the vessel looks up best for her port, and not to go about until she has brought herself to a position on which the other tack is the most favorable, and so on. The ship thus constantly keeps her port in the wind's eye, and any change in the direction of the wind can be taken advantage of. But if a vessel stands on till the tack be a losing one in order that she may fetch her destination on the next tack, a change in the wind may put her dead to leeward of her port, and she will have lost ground by the ill-judged tactics.

When tacking out of sight of land, the direction and length of each successive board can be pricked out on the chart by using the dividers and parallel rule in the manner already described, and the position of the vessel at any time will thus be known.

Before land is lost sight of, what is termed a departure is taken from the last well-known object on the shore. Its bearing is taken by compass, its distance by log is estimated, and the time is noted. A departure can also be taken by cross bearings.

It is from the departure that the voyage is reckoned out.

In determining the course and position of a vessel at sea, allowance must be made for leeway and for the set of the tide. The leeway is greater when the sea is rough and when the sails are reefed. The amount of leeway can be roughly estimated by looking over a vessel's stern at her wake, which will not be in the same line as her keel, but at an angle to it.

Having measured this angle, apply it to the left when the vessel is on the starboard tack, to the right when she is on the port tack.

If the strength and direction of a current are known, its effect upon the vessel's course and distance made must be allowed for.

If the set of the current is in the same direction as the ship's direction—either with her or opposed to her—her course is unaffected, but her rate of motion over the ground is increased or lessened by as many knots an hour as the current is flowing. The rate of current must therefore be added to or deducted from the distance logged. The log, of course, only indicates the vessel's speed through the water, and does not register the current.

If the current is across a vessel's direction it will influence both her course and rate of sailing.

In order to find the course that should be steered so as to make good a required course in a cross current we proceed as follows. In either of the two Figs. 51 and 52, let A be the position of the vessel, B the port we desire to make, and let the arrow represent the direction of the current. With the dividers take from the scale at the side of the chart the number of miles the current runs per hour, and lay down this distance A C in the direction of the arrow. Then take from the scale the number of miles the vessel is going per hour, and with this distance as radius, and C as the center, describe a circle.

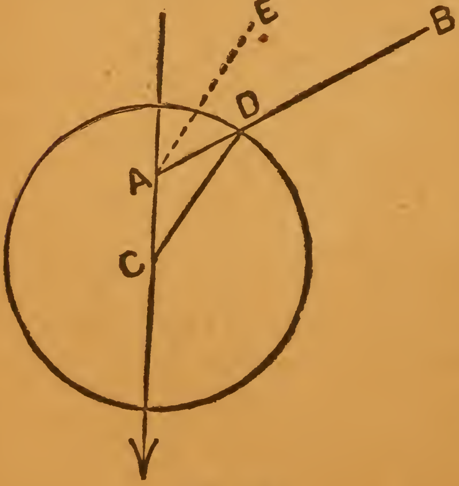

Fig. 51.

The line joining C and

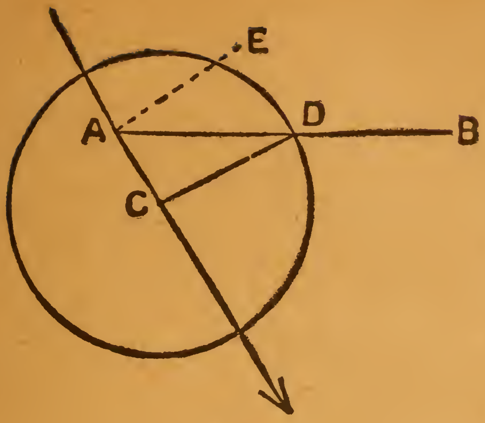

Fig. 52.

D—the point where the circle and the line A B cut—represents the direction in which the vessel must be steered so as to keep on the line A B. Draw A E parallel and equal to C D. Then if the vessel be steered from A toward E, and travel the distance A E through the water she will in reality have made the distance A D in the direction of her port. In the two figures the alteration of the vessel's course is about the same, but as the current is contrary in Fig. 51, A D, the distance made, is much less than A E, the distance sailed, whereas in Fig. 52 the current is favorable and therefore the distance made is greater than the distance sailed.

In current sailing every advantage must be taken of the tide, and it is often possible to fetch a port dead to windward on one tack by what is termed underbowing the tide.

For instance, if we are bound for a port due north of us, and the wind is also due north, while we have a current running to the eastward, we can, by putting our vessel on the tack that directs her to the westward of north—that is, in this case the starboard tack, bring the tide on the lee bow so that the result of our northwest course and the easterly current is that our vessel travels due north.

Hence it is very necessary, while tacking across the sea, to know when the tide will turn, so that we can put the vessel about to the best advantage.

If we are crossing a broad stretch of water, with the wind free, and are likely to be in more than one tide, we can steer a course straight for our port, without paying much attention to the currents, as the effects of the ebb and flood will cancel each other, and we will be able to make a good land-fall.

The rise, rate, and direction of the tide at springs and neaps are generally given on the chart. If the hour of high water for the particular day and place are known, the speed of the current and the height above low water can be roughly calculated from the following data. Unless the conformation of the coast produces a variation from the general rule, the tide rises from low to high water in six hours and a quarter, and falls from high to low water in the same time. The rise and fall are not uniform. During the first and last hours of flood the rise is smallest. During the second hour it greatly increases. At the fourth hour the tide has reached its maximum rate, and from then the rate of rising diminishes in the same proportion until high water. The same rule applies to the ebb tide.

Fig. 53 represents the range of the tide in the open sea, which we have divided into sixteen equal parts. It has been found that the tide will rise one division in the first hour, three in the second hour, four in the third hour, four in the fourth hour, three in the fifth hour, and one in the last sixth hour and a quarter.

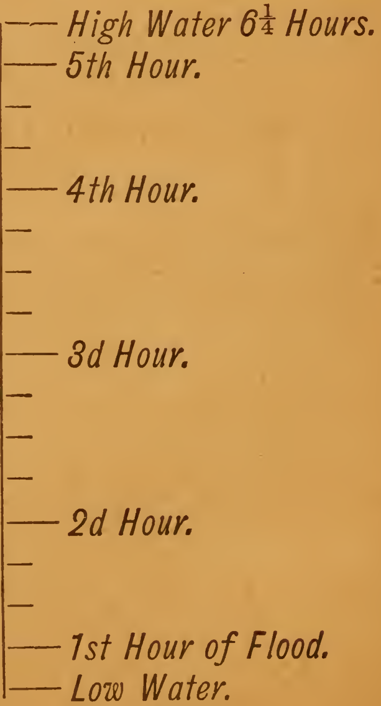

Fig. 53.

We have already explained that the time of high water at any particular spot at the full and change of the moon is indicated on the chart—thus, for instance, H.W. at F. and C. 6 h. 10 m., which signifies high water at full and change of the moon at six hours ten minutes. If we have no tide tables at hand we can roughly calculate the time of high water for the day by adding forty-eight minutes for every day that has passed since the last full or new moon to the time at full and change given on the chart. But a more accurate method is to refer to the Admiralty tide tables, or, what will answer the purpose equally well, to some nautical almanac. Here he will find daily tide tables, morning and afternoon, for the principal ports, together with the height of the rise in feet.

Besides these, there is an extensive list of ports and positions on the coast of America with their tidal constants. The constant for a given place is the number of hours and minutes that are to be added to or subtracted from the time of high water at the standard port or port of reference in order to obtain the time of high water at the given place.

For instance, supposing New York to be the standard port, and we require to know the hour of high water at Portland on a given day. We first refer to the table of constants, and find plus 5 h. 3 m. to be the constant of Portland. We then turn to the New York tide table, and find the time of high water for the day—morning or afternoon, as the case may be. We add five hours and three minutes to this, and the result will be the required time. Had the sign before the constant been minus istead of plus we should have subtracted and not added.

If we require the high water at a port where the tidal constant is not given in the tables, but where high water at full and change is given on the chart, find the high water at full and change of some port—New York, for example, whose constant is in the tables. Substract the lesser of these twice from the greater, the remainder will be the constant of our port—additive if the full and change at the port be greater than that of New York, subtractive if it be less.

CHAPTER XIV.

WEATHER WISDOM.

Use of the instruments—Forecasting weather from natural phenomona, etc.

Weather wisdom is more necessary to the man who travels along the coast in a small vessel than to any one else. A large vessel is constructed to encounter any weather with safety, and she must take fair and foul as she finds it; but the safety of a small craft often depends entirely on an accurate forecast of the wind. When the skipper of the little yacht undertakes a voyage, say from New York to Atlanta, he has to pick his weather. He waits in port till he gets a slant—that is, until he has satisfied himself that in all human probability no wind of dangerous strength will blow in the course of the next few days—then he weighs his anchor, hoists his sails, and speeds across the broad sea as fast as he is able, knowing that should a gale of wind spring up before he has made the opposite coast, he will be in considerable peril and not improbably be lost.

But the mariner who has made himself acquainted with the science of meteorology can make a coasting voyage, even in a tiny craft, from one end of America to the other, sailing from port to port in favorable weather, and dodging the storms that would infallibly destroy him, by foreseeing them and remaining in snug harbors until they have passed by.

In following the rules which we shall now lay down, the amateur will sometimes find that his forecast of storm will prove a false alarm and will keep him in port idle while he might have been at sea; but on the other hand—and what is far more important—a forecast of fair weather is very rarely wrong; a really dangerous wind is scarcely ever known to spring up without having given a due warning of its approach.

The weather can be foretold with considerable accuracy by observing the appearance of many natural phenomena, the clouds, the water, the sun and moon, and also by the movements of fish and fowl; but the changes of the barometer are far more to be depended on than the above as indications of coming weather.

Every small yacht should be provided with an aneroid barometer, which is more sensitive and indicates change more quickly than the mercurial barometer, also with a thermometer, and, if the yachtsman wishes to have a complete meteorological outfit, with a hygrometer or wet bulb thermometer. These three instruments will enable him to measure the weight, the temperature, and the degree of moistness of the atmosphere. The last of the instruments mentioned is not often found on a small yacht, and indeed the aneroid and thermometer suffice for ordinary purposes of weather-forecast.

It must be remembered, while foretelling the weather, that the barometer is affected:

Firstly, by the direction of the wind. The greatest rise being with the northeast wind, the lowest fall with the southwest wind.

Secondly, by moisture, an increase of which will cause a fall.

Thirdy, by the force of the wind. If a wind freshens the moisture and direction of the wind remaining the same, the glass will fall.

These three causes do not often act in accord; one is generally affecting the glass in a way opposite to the other two. It is for this reason that an observation of the barometer alone will often mislead us. It must be read in conjunction with the thermometer and also with the hygrometer, in order to determine the true cause of the rise or fall of the mercury.

The barometer rises for northerly wind (including from N.W. by the N. to E.,) for dry or less wet weather, for less wind, or for more than one of these changes; except on a few occasions, when rain (or snow) comes from the N. with strong wind.

The barometer falls for south wind (including from S.E. by the S. to W.), for wet weather, for stronger wind, or for more than one of these changes; except on a few occasions, when moderate wind with rain (or snow) comes from the northward.

The following rules are selected from the official computation, which is very comprehensive and should be studied by every yachtsman. Admiral Fitzroy's book should be on every yacht's library shelf.

If the barometer has been at its ordinary height—about thirty inches at sea-level—and is steady or rising, while the thermometer falls, and dampness lessens, N.W., N., or .E., or less, wind may be expected.

If the barometer is falling, the thermometer rising, and the dampness increasing, wind and rain, or snow may be expected from S.E., S., or S.W.

The most dangerous shifts of wind and the heaviest gales from N. happen after the mercury first rises from a very low point.

A rapid rise of the barometer indicates unsettled weather; a slow rise, or steadiness with dryness shows fair weather.

The greatest depressions of the barometer are with gales from S.E., S. or S. W.; the greatest elevations with winds from N.W., N., or N.E.

Sudden falls of the barometer with west wind are sometimes followed by violent storms from N.W. and N.

If a gale sets in from the E. or S.E., and the wind veers by the S., the barometer will continue falling until the wind becomes S.W., when a comparative lull may occur, after which the gale will be renewed, and the shifting of the wind toward the N.W. will be indicated by a fall of the thermometer as well as a rise of barometer.

If a change of weather is long foretold by the barometer, the longer the presaged weather will last, and *vice versa.* The sailor expresses this in the rhyme:

"Long foretold, long last;
Short warning—soon past."

Many more rules have been laid down by the meterological observers, for which we have no space here; but we will now give a few brief rules on the forecast of weather by the observation of natural phenomena, which are useful by themselves, but still more so when confirming the forecast we have made from the instruments.

A halo around the moon, especially if it appear distant and yet very distinct, indicates a gale of wind, and probably rain.

When high lands are shrouded in mists, southwest gales and rain may be expected.

If distant objects are very clear and raised by reflection, rain (possibly wind also) is near.

"Wind dogs," which are like broken portions of a rainbow seen to windward in the morning, are very certain signs of a gale.

"Mare's tails," which are ragged streaks of cloud, having little motion, foretell gales from the direction they radiate from.

In fine weather the wind generally follows the sun—that is, it blows from the east in the morning and from the west in the evening.

If the wind blows from west in the morning, and "backs" against the sun, till it is east in the evening, bad weather will follow.

A red sunset presages fine weather.

A red sunrise presages bad weather.

A bright yellow sky at sunset is a sign of wind; a pale yellow, of wet.

A gloomy dark blue sky is a sign of wind, while a light blue sky indicates fine weather.

The sun's setting or rising behind a bank of clouds indicates rough weather.

A phosphorescent sea is a very certain sign of a continuance of fine weather.

The presence of vast quantities of jelly-fish presages fine weather.

Sea-birds fly far out to sea in fine weather; but if they fly inland bad weather may be expected.

When porpoises come into shallow water and ascend the rivers, stormy weather is near.

CHAPTER XV.

YACHT RACING.

The new Y. R. A. rule of measurement—Sail area—Tlme allowance—Rules of racing—Methods of starting.

Other things being equal, the speed of a vessel increases with her size; so it has always been the custom to handicap yachts competing in a race by giving time allowance to smaller craft.

In order to carry out this handicapping it is of course necessary to have some general rule of measurement by which the size—so far as racing is concerned—of any yacht can be determined with exactitude. It has taxed the brains of yachting men from the earliest days of the sport to discover some standard of measurement which will be fair to all, and which will tend to encourage the building of a class of seaworthy pleasure vessels, and not of mere racing machines.

Until within the last two years the Yacht Racing Asociation rule for measuring a yacht's tonnage was as follows: "Add the yacht's greatest breadth to her length along the load-line; multiply the sum thus obtained by itself, and by the breadth; then divide the product by 1730; and the quotient shall be the tonnage in tons and hundreths of a ton."

Thus the length and beam were the only factors to be taken into consideration while calculating a yacht's tonnage. The displacement, draught, and sail area counted for nothing. The natural result followed. As beam was discouraged, it became apparent that the fastest boat for her tonnage, according to this artificial rule, was a long narrow craft with great draught, large sail area, and a lead mine on her keel; consequently uncomfortable in a sea way, and affording, for her size, very cramped accommodation to her passengers; in short, a cup-winning machine unfit for anything but racing.

But now, at last, all this has been changed. The old Y. R. A. rule has been done away with, and a system of measurement on entirely new principles has been introduced which does not tax a vessel's beam, and the sole factors in the calculation for which are length and sail area.

This revolution in yacht rating has taken place so recently that its results, as regards the type of vessels that will be constructed with a view to meeting the new conditions, have not yet had time to declare themselves; but it is claimed by many sanguine people that under these rules the old-fashioned wholesome beamy vessel will have its day again, that the "plank set up on edge" style of craft is doomed, and that the fastest yacht will also be the best boat.

The following are the new Y. R. A. rules of measurement. We will quote the more essential rules, and those parts only of these which apply to small yachts such as we are writing about.

Rule 3.—The rating of every yacht entered to sail in a race shall be ascertained by multiplying the sail area in square feet (as found in the manner hereinafter enjoined) by the length in feet on the load water-line, and dividing the product by 6,000; the quotient shall be the rating, and in rating above 10, a fraction of or exceeding ·01 shall count as 1; but in rating from 1 to 10, a fraction smaller than ·01 shall count as ·1 (see Rule 4). The length shall be taken in a straight line from the fore-end to the after-end of the load water-line, provided always that if any part of the stem or stern-post or other part of the vessel below the load water-line project beyond the length taken as mentioned, such projections shall, for the purpose of the rule, be added to the length taken as stated; and pieces of any form cut out of the stem, stern post, or fair-line of the ridge of the counter, with the intention of shortening the load water-line, shall not be allowed for in measurement of length, if at or immediately below the load-line, nor above if within six inches of the water-level.

MAINSAIL.—A, measured from the top of the boom (over the pin for outhaul sheave) to the gaff under the pin of the topsail sheet sheave, provided the peak cringle of the mainsail does not extend beyond the pin; in the case of the yacht having no topsail, or of the peak cringle extending beyond the pin of the topsail sheet sheave, then the measurement to be taken to the peak lacing-hole.

B, perpendicular to A, measured to underside of gaff close into the mast.

C, measured from top of boom over the pin of the sheave for outhaul to underside of gaff close into the mast.

D, perpendicular to C, measured in to the mast, in a line with the top of the boom, or to tack cringle of mainsail, if below top of boom.

To find the area of the mainsail, multiply A by B and C by D, and add the two products together and divide by two.

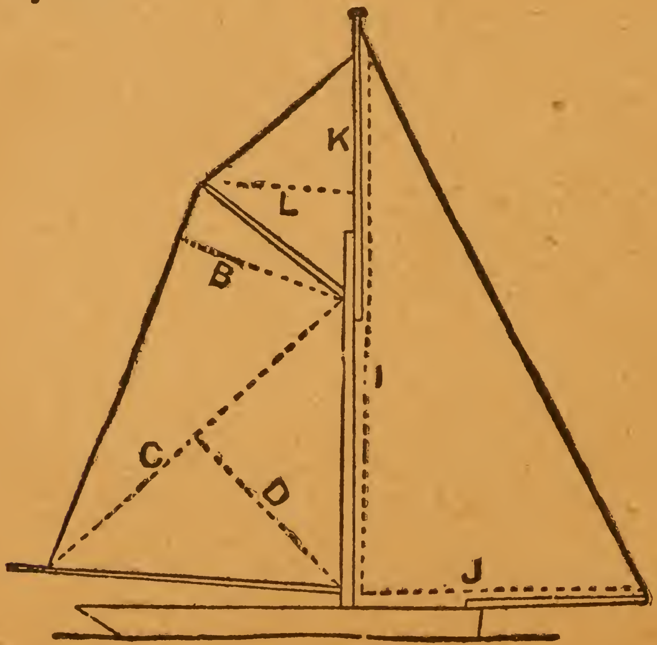

Fig. 54.

JIB-HEADED TOPSAIL.—K, measured from top of gaff close in to mast to pin of halyard sheave in topmast.

L, perpendicular to K, measured to pin of topsail sheet sheave in gaff; or to lacing-hole in jackyard.

To find the area of the Jib-header, multiply K by L and divide the product by two.

HEAD SAILS.—I, measured from the main boom goose-neck to the shoulder of topmast, or in cases where no sails are attached to the topmast stay or pole stay, the measurement to be taken from the main boom gooseneck to the pin of the highest sheave in or on the topmast or pole, or to the pin of the sheave of any block secured to the topmast or pole, and used in either case for head sail or spinnaker.

J, measured from the foreside of the mast to top of cranse iron on bowsprit end where cut by line of topmast stay or pole stay; or, in cases where no sail or sails are attached to the stay, the measurement to be taken from the foreside of the mast to the pin of the sheave for jib outhaul.

In all cases, if the distance from the center fore and aft line of the mast to the outer end of spinnaker boom (when shipped in its place and square to the keel) exceeds the distance from the fore side of the mast to the cranse iron on the bowsprit end (where cut by the line of topmast stay), or pin of sheave for jib outhaul as the case may be, the excess shall be added to the base of the triangle formed by the head sails; and the area of the head sail to be computed accordingly.

In the case of a yacht having no head sail, but carrying a spinnaker, the area for head sail shall be computed from the length of spinnaker boom and the height from main boom gooseneck to shoulder of topmast, or highest pin in sheave of pole-mast, as provided for in this rule.

The length of head-stick or heal-yard to spinnaker shall not exceed one-twentieth the length of spinnaker boom. Foot yards not allowed on spinnaker.

To find the area of head sails, jib, topsails, or spinnaker, multiply I by J and divide by two.

To find the area of head sail, for pole mast, multiply I by J and divide by two.

Lug Sails with Head Sails.—In the case of a lug sail, standing lug sail, or balance lug sail being carried, the actual area of the same shall be computed; and if head sail be also carried, the measurements for computing the area of the same shall be taken from foreside of mast, etc., in accrdance with the method provided in the rule for head sails.

Yawl Sails.—The area of a schooner's sail or a yawl's sail would be similarly found; in the case of a yawl having a lug mizzen, the lacing-holes in the yard would be taken as the upper boundaries.

Time Allowance (Rule 4).—Time shall be allowed on arrival for differences in rating, according to the annexed scales, increased or decreased in proportion to the length of different courses. In all time, where time has to be allowed for difference of rating in yachts of 10 rating and under, it shall be computed by the rating and fractions of the rating in accordance with the time scales.

It will suffice to say here, that if a vessel's rating is x, t, the allowance she makes per knot to a yacht whose range is 1, will be thus found:

$$t = 360 - \frac{360}{5 \sqrt{x}.}$$

The result is the allowance in seconds. As the allowance is calculated for one knot, the allowance for another distance will be found by multiplying by the length of the course in knots. To calculate the allowance that should be made by one yacht to another, find the t, as above, for both yachts. Substract the lesser from the greater t. The result will be the time in seconds to be allowed per knot by the yacht rating highest.

Allowance to Schooners and Yawls.—The Yacht Racing Association recommend for the consideration of sailing committees: (1) That as mixed races are no satisfactiory test of the relative speed of yachts, the different rigs should, whenever practicable, be kept separate; but when mixed races are unavoidable, the following rule shall be observed:

The rating of schooners and yawls to be reckoned for time allowance as follows, viz. schooners at three-fifths, and yawls at four-fifths of their actual rating; provided that in case of a yawl, her mainsail does not exceed ·37 of her total sail area, and that her mizzen is not less than ·06 of her total sail area. In the case of a pole-masted yawl, her mainsail shall not exceed .46 of her total sail area, and her mizzen shall not be less than ·75 of her total sail area. In schooners, the foreside of the mainmast shall, at the deck, be not further forward than the middle of length of the load water-line.

Ketches and luggers shall be reckoned for time allowance at three-fifths their rating; provided that in a ketch the distance between the masts does not exceed half the length of the load water-line of the yacht, and that the smaller sail is carried aft. In the case of a lugger, to be entitled to the rig allowance, the yacht must have two or more masts, and the after, or the middle mast, at the deck must not be forward of the middle of length of the load water-line, and in the case of a two-masted lugger, if the area of the after lug be less than half the area of the main lug, she will be rated as a yawl.

In calculating the deduction for difference of rig, the rating by certificate to the exact fraction must be used. The time allowances to be calculated from each yacht's reduced rating; but schooners and yawls shall not be allowed to qualify to enter by their reduced rating in a class race.

In racing for mixed rigs, the time allowances between yachts of the same rig must be calculated on each yacht's reduced rating.

Yachts fitted with center-boards have up till now been prohibited by the Y. R. A. rule from competing in races sailed under those rules. But this has now been changed, and in place of the old Rule 8, we have the following regulation: Rule 8.—"In the case of a yacht fitted with a center-board or plate, or other form of shifting keel, manual power only shall be employed in working it."

In Rule 17, the rules of the road for yacht racing are given. As these are the same as the Board of Trades rules for avoiding collision, which we have already quoted, we need not recapitulate them here. But the following additional rules of the road have been framed especially for yachts competing in a race.

Rule 18.—When rounding any buoy or vessel used to mark out the course, if two yachts are not clear of each other at the time the leading yacht is close to, and actually rounding the mark, the outside yacht must give the other room to pass clear of it, whether it be the lee or weather yacht which is in danger of fouling the mark. No yacht shall be considered clear of another yacht, unless so much ahead as to give a free choice to the other on which side she will pass. An overtaking yacht shall not, however, be justified in attempting to establish an overlap, and thus force a passage between the leading yacht and the mark, after the latter yacht has altered her helm for the purpose of rounding.

Rule 19.—When passing a pier, shoal, rock, vessel, or other obstruction to sea room, should yachts not be clear of each other, the outside yacht or yachts must give room to the yacht in danger of fouling such obstruction, whether she be the weather yacht or the leeward yacht; provided always that an overlap has been established before an obstruction is actually reached.

Rule 20,—A yacht overtaking any other shall keep out of the way of the overtaken yacht; and a yacht may luff as she pleases to prevent another yacht passing to windward, but must never bear away out of her course to hinder the other passing to leeward—the lee side to be considered that on which the leading yacht of the two carries her main boom. The overtaking vessel, if to leeward, must not luff until she has drawn clear ahead of the yacht she has overtaken.

Rule 21.—If two yachts are standing towards a shore or shoal, or toward any buoy, or boat, or vessel, and the yacht to leeward is likely to run aground or foul of such buoy, boat, or, vessel (a mark vessel excepted), and is not able to tack without coming into collision with the yacht to windward, the latter shall at once tack, on being hailed to do so by the owner of the leeward yacht, or the person acting as his representative, who shall be bound to see that his own vessel tacks at the same time.

Rule 22.—Any yacht running on shore, or foul of a buoy, vessel, or other obstruction, may use her own anchors, boats, warps, etc., to get off, but may not receive any assistance except from the crew of the vessel fouled. Any anchor, boat, or warp used, must be taken on board again before she continues the race.

Rule 23.—Each yacht must go fairly round the course; and must not touch any buoy, boat, or vessel, used to mark it out, but shall not be disqualified if wrongfully compelled to do so by another yacht. Any yacht causing a mark vessel to in any way shift her position to avoid being fouled by such yacht, shall be disqualified. If a yacht, in consequence of her neglect of any of these rules, shall foul another yacht, or compel other yachts to foul, she shall forfeit all claim to the prize, and shall pay all damages.

Rule 24.—No towing, sweeping, poling, or pushing, or any mode of propulsion, except sails, shall be allowed, except for the purpose set forth in Rule 22.

Rule 25.—A yacht may anchor during a race, but must weigh her anchor again and not slip. No yacht shall, during a race, make fast to any buoy, pier, or other object, or send an anchor out in a boat, except for the purpose of Rule 22.

Rule 26.—No other means of sounding than the lead and line allowed.

The following rules refer to various matters:

Rule 6.—Each yacht entered for a race, must be the *bona fide* property of the person or persons in whose name or names she is entered, who must be a member or members of a recognized yacht club.

A yacht. whilst let on hire, shall not be allowed to compete under these rules.

RULE 7.—No owner shall be allowed to enter more than one yacht in a race, except in cases in which a prize is given for each rig, when one yacht of each rig may be entered; nor shall he be entitled to enter the same yacht under different rigs for any race.

RULE 9.—Every yacht sailing in a race shall have on board a member of a recognized yacht club, who, before the prize is awarded, shall sign a declaration that the yacht under his charge has strictly conformed to all the sailing regulations.

RULE 12,—There shall be no restrictions as to sails, or the manner of setting and working them; but manual power only may be used for hoisting and working them.

RULE 13.—There shall be no limit as to the number of paid hands, and no restriction as to the number of friends, or to their working. No paid hand shall join or leave a yacht after the signal to start, except in case of accident or injury to any person on board. [This rule is not intended to apply to Corinthian matches.]

RULE 14.—All yachts exceeding a rating of 10 shall be fitted below deck with the ordinary fittings of a yacht, including two transverse bulkheads of wood. The following shall apply to all yachts: their platforms shall be kept down, and bulkheads standing.

No water shall be started from or taken into the tanks after the signal to start has been made. No more than the usual anchors and chains shall be carried during a race, which must not be used as shifting ballast, or for altering the trim of the yacht. No bags of shot shall be on board, and all ballast shall be properly stowed under the platform or in the lockers, and shall not be shifted or trimmed in any way during a race. No ballast or other dead weight shall be shifted, shipped, or unshipped, so as to alter the length of the load water-line, after a yacht has been entered for a race, nor without giving notice thereof to the secretary, as enjoined in Rule 3.

The Y. R. A. rules for ascertaining the area of sails for rating purposes seriously handicap small yachts rigged in what may be termed river fashion. For instance, the area of the head sails of a lug-sail boat is computed in accordance with the method provided in the rule for a cutter's headsails; that is, the after limit of the area is taken along the mast; whereas a lug-sail, projecting before the mast, prevents the boat from carrying head sails that will reach so far aft as the mast.

Again, in the case of a cat or balance lug-boat carrying a spinnaker, but no head sail's, the whole area of the spinnaker, is reckoned in the rating; whereas in the case of a boat carrying head-sails as well as spinnaker, the area of the spinnaker is not taken into account at all unless it be larger than that of the head-sail, in which case the difference between them is added to the sail area. The result is that the first boat only carries the sail area for which she is rated when running before the wind.

There are various methods of arranging the start in a yacht race. One plan is to have the competing yachts anchored or moored in a line with all sails down, or after sails up and head-sails down, or all sails up, as the sailing committee may direct. Lots are drawn for the different stations. Five minutes before the start a Blue Peter is hoisted and a gun is fired. At the expiration of the five minutes the Blue Peter is hauled down, and a second gun is fired as a signal to start. The yachts then slip from their moorings. If a yacht lets go her moorings or drag her anchor before the second gun is fired, she is liable to be disqualified, unless the parting or dragging be explained to the satisfaction of the committee, or unless she has returned, after the signal to start, within the line of starting buoys, so as not to obtain any advantage from the accident.

Another method of starting is what is known as a flying start. The yachts are all under way, and have to keep inside an imaginary line between two marks until the starting gun is fired. Then they cross the line. If the yacht crosses the line before the signal, she must return and recross it.

Should the owner of any yacht or his representative consider that he has a fair ground of complaint against another for foul sailing, or any violation of the rules, he must, if it arises during the race, signify the same on first passing the committee vessel, by showing an ensign conspicuously in the main rigging.

CHAPTER XVI.

GLOSSARY OF NAUTICAL TERMS.

Those nautical terms whose meanings have already been defined at some length in this work, will not be repeated in this glossary.

Aback.—Said of a sail when its sheet is to windward and it drives the vessel astern.

About.—On the other tack.

A-lee.—The position of the helm when it is put in an opposite direction to the wind.

A-peek.—When the chain is hove taut and the the vessel is over her anchor.

A-trip.—Said of an anchor when it is hauled clear of the ground—same as weighed.

Balance Reef.—A diagonal reef in a fore-and-aft sail extending from throat to clews.

Battens.—Pieces of wood fastened to the reef-bands of lug-sails to make them stand flat.

Beamy.—Broad; said of a vessel when her breadth is great in proportion to her length.

Bear Away.—To steer so that a vessel sails off her course to leeward.

Belay.—To make fast the end of a rope temporarily by turning it round a cleat.

Bight.—The loop formed by a rope when a knot or hitch is being made.

Bolt Rope.—The rope surrounding a sail, and to which the canvas is sewed.

Brail up.—To furl a sail along the mast by hauling on a rope which is led from the mast round the sail.

BRAEMING—Cleaning a vessel's bottom by burning the paint or tar off.

BRIDLE.—A rope with its two ends fastened to the two ends of a spar—as to a trawl beam, or to a deep-sea anchor—and held by a rope attached to the middle of the bight.

BROACH TO.—To fall off so much, when going free, as to bring the vessel nearly broadside on to the wind.

BULKHEAD.—Partitions dividing a vessel into sections.

BUMPKIN.—A spar projecting from a vessel to which a sheet or rope is led; for instance, the mizzen sheet is led through a block or sheave-hole at the end of the mizzen bumpkin.

CHANNELS.—Stout pieces of timber bolted on the outside of a vessel, to which the deadeyes of the rigging are fastened.

CHOCK A BLOCK.—When the upper and lower blocks of a tackle touch each other and one can hoist no higher.

CLEW.—The lower after corner of a fore-and-aft sail.

CLIP-HOOK.—A metal eye, with two hooks attached to it, working on the same pivot, so that they overlap when closed.

CLOSE-HAULED.—Said of a vessel when she is sailing as close to the wind as possible.

COAMINGS.—A raised ledge round the well of a boat to prevent the water running in.

CRANSE-IRON.—An iron hoop at the bowsprit end, with eyes fitted to it, to which the bobstay and topsail stays are fastened.

CRINGLE.—A rope eye spliced into the bolt rope of a sail inclosing an iron thimble, through which a reef earing is rove.

CROWN OF AN ANCHOR.—Where the arms and shank join.

CRUTCH.—A wooden support for the main boom when the mainsail is furled.

DEAD-EYE.—A wooden block with three sheaveless holes through which the lanyards of the main-shrouds are rove.

DINGHY.—The smallest of a yacht's boats.

EARING.—A rope which passes through the cringle of a sail and serves to reef it.

EYES OF THE RIGGING.—The loop of the shrouds and stays which are passed over the mast-head and rest on the hounds.

FAIR-LEADER.—A block or comb cleat for running rigging, *e. g.*, jib sheets to lead through.

FLUKES.—The barbs at the extremities of an anchor's arms.

FOREFOOT.—A piece of timber at the fore end of the keel, to which the heel of the stem fits.

FOREREACH.—To shoot ahead in stays.

GARBOARD STREAK.—The range of planks on each side of the keel.

GET IN IRONS.—A vessel is in irons when she is in the wind's eye, and, having lost all headway, will not go off on either tack.

GIMBALS.—A contrivance consisting of two or more metal hoops balanced on pivots, so that a compass or lamp swung within the gimbals will not oscillate, but preserve a vertical position.

GRAPNEL.—A small anchor having more than two arms.

GROUND TACKLE.—The tackle—anchor, cables, and springs—used in anchoring a vessel.

GUY.—A rope attached to anything to steady it and prevent its moving. Thus a spinnaker boom has its fore and after guys, and a mainboom is to prevent its swinging aft.

HAWSE-HOLE.—The hole in the bows through which the chain runs.

HAWSER.—A large rope used for warping, etc.

HELM DOWN.—When the helm is put over in the direction toward which the wind is blowing.

HELM UP.—When the helm is put over in the direction the wind is blowing from.

HOUNDS.—The wooden shoulders at the masthead on which the eyes of the shrouds rest.

HOUSE.—To house a topmast is to lower it.

JIBE.—When running, to bring the wind on the other quarter, so that the boom swings over.

KEDGE.—A small anchor. To kedge, is to warp a vessel along with hawser and kedge.

LANYARDS.—Ropes rove through the dead-eyes to set up the standing rigging.

LEE-HELM.—A vessel is said to carry lee-helm when she has a tendency to pay off before the wind, and the tiller has to be kept down in order to counteract this.

LIMBERS.—Holes cut in the floor timbers to allow the water in the bilge to flow freely.

LIST.—Said of a vessel when she leans sideways, for instance to leeward before the pressure of the wind.

MARLINE.—Small cord or spun-yarn.

MOUSE.—To put turns of rope yarn round a hook so as to prevent it slipping out from what it is hooked to. For instance, the sister hooks of the jib sheets are moused to prevent them escaping from the clews of the jib.

NEAPED.—When a vessel has got aground at the top of the spring tides and must await the next springs before she can get off.

PREVENTER.—An additional rope placed to assist another one in supporting a strain, *e. g.*, a preventer backstay.

PURCHASE.—An arrangement of ropes and pulleys by which a mechanical power is gained.

QUARTER.—The after part of a vessel's side.

RANGE.—To range chain, is to get a certain quantity before the windlass so that, when the anchor is let go, it will run out to the bottom without a check.

REEFING.—To reduce the area of a sail by rolling and tying up a portion of it. Also to shorten the bowsprit by hauling it partly in board.

ROUND IN.—To haul in on rope.

RUN.—The run of a vessel is the after part of her narrowing up to the stern post. To let a halyard go by the run is to let it go altogether and not to slack it out gently.

RUNNING.—Sailing befcre the wind.

RUNNING RIGGING.—The ropes, such as halyards, that are hauled upon in order to hoist or trim sails, as opposed to the standing rigging—shrouds and stays which are not moved in working a vessel.

SAG.—To sag to leeward is to drift before the wind or make leeway.

SCUPPERS.—Holes through which the water runs overboard off the decks.

SHAKE UP.—To luff up for a short time without losing a vessel's way, so that the sails may shake, and the pressure of the wind being taken off them, the crew are enabled to take a pull on the halyards or purchases.

SHANK.—The long bar or stem of an anchor connecting the arms with the stock.

SHEAVE-HOLE.—A hole in a spar to reeve a rope through.

SHEET.—A rope attached to the clews of a sail, by means of which the sail is trimmed to the wind.

SMALL STUFF.—Spun-yarn, marline, etc., used for serving, seizing, and other purposes.

SPARS.—The masts, yards, booms, etc., on which a vessel's sails are extended.

STAYS.—Ropes supporting a mast. IN STAYS.—When a vessel is in the wind's eye while going about from one tack to another.

STERNBOARD.—When a vessel is going stern foremost.

STIFF.—A vessel is stiff when she can carry plenty of sail without listing over. The opposite to crank.

STOCK.—The cross bar at the end of an anchor's shank.

STOP.—A fastening of small stuff.

STROP.—An eye of rope or wire spliced round a block.

TABERNACLE.—A mast-step on deck, in which the mast works on an iron pivot, and so can be easily lowered.

TACK.—The lower fore corner of a sail.

TAFFRAIL.—The rail round a vessel's stern.

THIMBLE.—An iron ring, with a concave outer edge, into which a strop can be fitted.

TOGGLE.—A pin fastened to the end of a rope, which can be thrust through the eye of another rope, and and so secure them together. The jib sheets are often secured to the clew of the jib in this way.

Topping Lift.—The rope which sustains the weight of the end of the boom, and by hauling on which the boom can be raised to the required height.

Truck.—A circular block of wood at the masthead with holes in it through which the signal halyards are rove.

Waist.—The midships section of a vessel.

Wash-boards.—Board placed above the gunwale of a boat to keep the water out.

Water-ways.—The long timbers running fore-and-aft that divide the decks from the vessel's sides.

Weather Helm.—A ship is said to carry weather helm when she has a tendency to come up into the wind, and requires the tiller to be kept to windward so as to counteract this.

Whip.—A purchase formed by a rope rove through a single block.

Yaw.—When a vessel goes off her course first to one side then to the other.

[THE END.]

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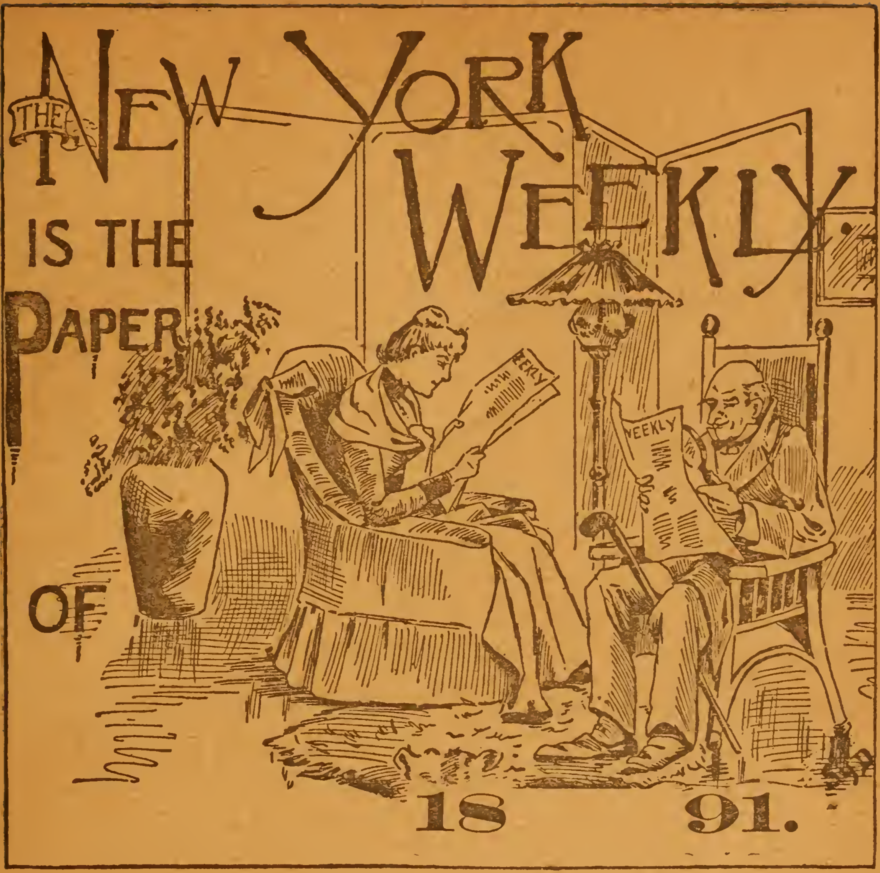

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